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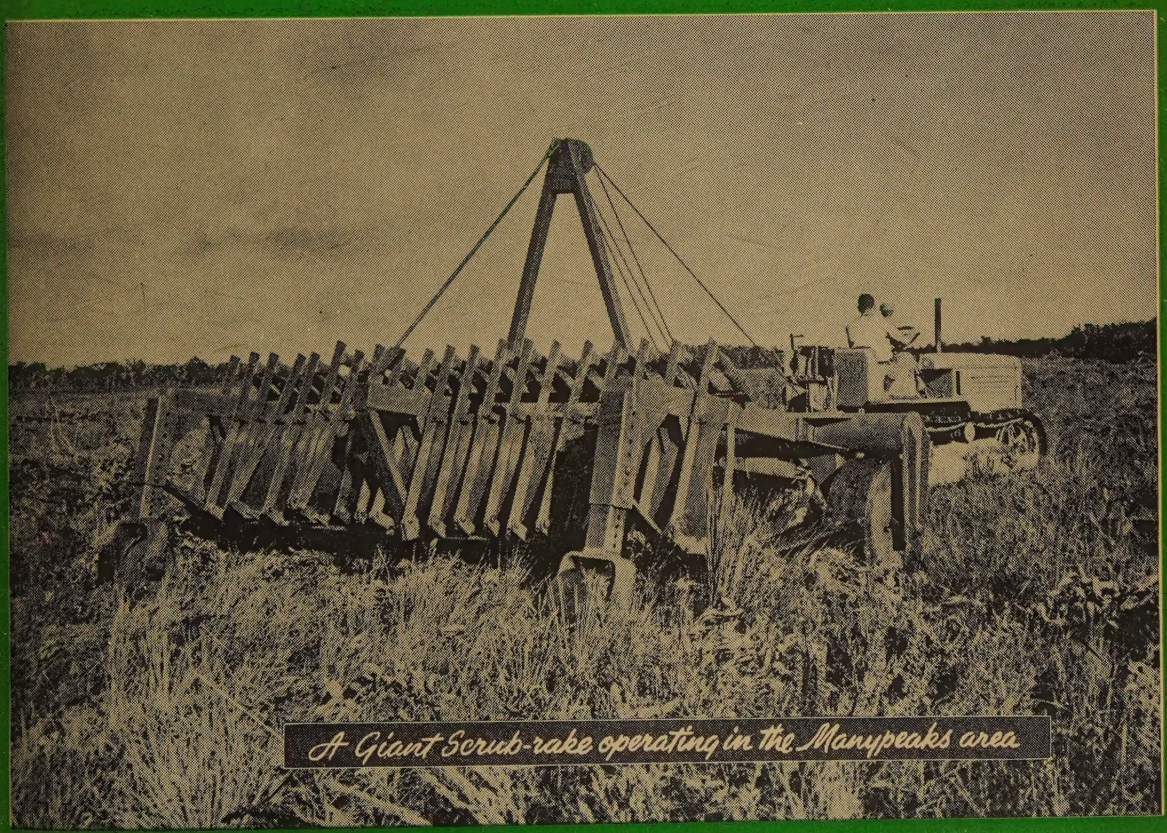

A Giant Scrub-rake operating in the Manypeaks area

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(Continued on Page 4)

His Work Endures

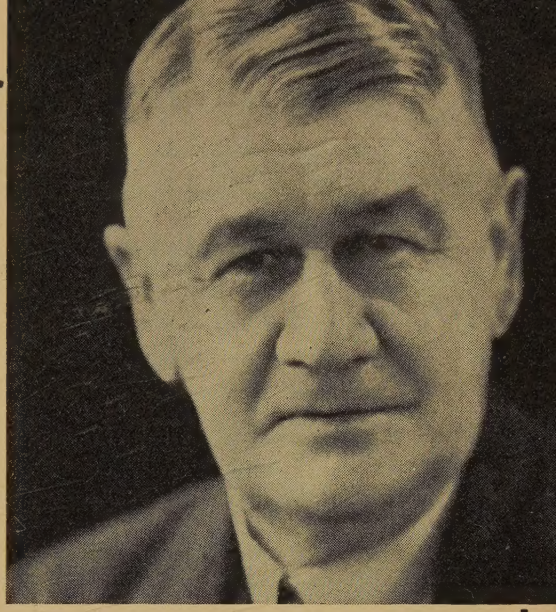
In presenting the first issue of the "Journal of Agriculture" in its new form, it is with profound sorrow that we chronicle the passing of the Hon. Garnet Barrington Wood, M.L.C., Minister for Agriculture and the North-West, who died suddenly during a Cabinet meeting on January 2. The change of policy in the presentation of this Journal was keenly supported by the late Minister, and only a few hours before his death he had promised to write a foreword to the first issue, which was to have appeared on this page.

A quiet-spoken and kindly man, with a well-developed sense of humour, Mr. Wood's warm human friendliness gained him not merely respect, but a deep and lasting affection from all who were privileged to know him and work with him.

An able administrator, he faced the many problems of his office fortified by a keenly receptive mind, a generous measure of sturdy commonsense and an inflexible honesty of purpose.

Happiest when he could avoid the limelight, he seldom stood on ceremony and, scorning to hedge himself about with the barriers beloved of lesser men, he was one of the most approachable Ministers this State has ever known. Keen-minded and farseeing, he never hesitated to forsake the beaten track for the more difficult pathways to achievement, nor would he sacrifice the principles in which he believed, in order to court political popularity.

As Minister for Agriculture he inaugurated a period of rapid progress in extending the work of his Department. Aided by the buoyancy of the State's finances and an unprecedented era of rural prosperity he extended the experimental work of the Department of Agriculture on its existing research stations and on experimental plots over a wide area of the State. New research stations came into being, one on the Esperance Plains, where some dynamic development has already taken place, and another at Bramley in the dairying belt of the South-West. Yet another research station was established to aid the poultry and market garden industries, a plot of land for the purpose being acquired adjoining Herdsman Lake.



THE LATE MINISTER

The formation of a North-West Branch in the Department of Agriculture paved the way for valuable research and advisory work in those areas, and Mr. Wood enthusiastically furthered the extension side of the Department's work throughout the State by the appointment of a large staff of instructors and district officers to strengthen the link between the agricultural scientists in the research field and the practical farmers.

Mr. Wood was largely responsible for the inauguration of the Agricultural Protection Board in this State which should herald a new era in the control of vermin, insect pests and noxious weeds. Unsparing of self, he continued to work at high pressure despite indifferent health, and his death was undoubtedly hastened by the fact that for many years he consistently placed duty ahead of personal well-being.

In his magnificent contributions to the agricultural development of his native State, Mr. Wood has left an imperishable monument to his ability and devotion to duty. The man has gone but . . . .

HIS WORK ENDURES

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READY FOR BURNING.—The size of these redgum logs, which the bulldozer has stacked on the property of Mr. F. Crooks, Cowaramup, is indicated by the fact that Mr. Crooks (standing in front) is 6ft. 2in. in height. There is still plenty of hard work ahead before the paddock is completely cleared.

SOIL CONSERVATION IN WESTERN AUSTRALIA

By G. H. BURVILL, M.Ag.Sc., Commissioner of Soil Conservation

SOIL is a farmer's basic asset. This issue of "The Journal of Agriculture" in a new form designed to provide still better service to the farming community, is an appropriate medium through which to remind the man on the land of what the soil means to him—and to the State. The farmer's duties to himself, his family and the State are summed up in the words "soil conservation" which is merely another way of saying "wise land use."

Soil conservation means using soil with an eye to the future. Nowadays the subject is frequently brought to the notice of farmers and the public through the press, radio and by films, leaflets and lectures. In presenting the topic, pictures or graphic descriptions of the ravages caused by soil erosion are always included.

Actually the prime reason for such publicity is because soil erosion is wasting an asset on which the human race depends for its very existence. Soil erosion is already evident in Western Australia where most of our land has been farmed for less than 50 years. It can be prevented or even cured by the adoption of suitable farming methods and practices, so that any farmer during his own lifetime may expect to reap benefits from conservation farming and be able to pass on to his family a heritage which is appreciating in value.

Soil conservation is vital to everyone, whether he be a farmer or a city-dweller, for the very existence of mankind depends on the soil. From it we get a large part of our food, clothing, warmth and shelter. The care of the soil is in the hands of the farming community and if a farmer can preserve and improve his soil he is safeguarding not only his own and his family's well-being but the very existence of Australia as a nation.

What should a farmer do to conserve and improve his soils, and especially to prevent their erosion and removal by water and wind?

Firstly, he should try to understand as much as possible of the soil make-up, and the way it functions in supplying essentials for plant growth. Secondly, he should strive to adapt his farming practices so as to assist and improve the soil to carry out those functions. In other words "use every acre according to its capabilities; treat every acre according to its needs."

WHAT IS SOIL?

Soil is the natural medium from which plants get mechanical support and from which, through their roots, they absorb water and many elements essential for successful growth.

The soil is the thin outer layer of the earth's crust, and is usually only a few feet thick. It is produced in Nature by the action of the weather, and of plants and animals, on the rocks of the earth's crust. The rocks and rock minerals are broken up and decomposed, and some new minerals with sticky clay properties formed. The remains of plants and animals which have lived on and in the soil partly decompose and provide humus. This humus darkens the surface layers and has important functions in supplying nitrogen, and holding moisture and plant nutrients such as phosphate and potash.

Teeming millions of bacteria, fungi, and other microscopic living things work ceaselessly in the upper layers of the soil, making over dead plant and animal remains into simpler products.

Gully erosion caused by uncontrolled run-off of water from sloping lands is quite common on Western Australian farmlands, but fortunately is not severe in many places. It must be taken as a stern warning however.

—Photo: Government Printer.

These can be taken up again by plants, or help to keep the soil in good condition for water absorption and aeration —the condition the farmer calls "good tilth." The soil is not just a mass of broken-up rock but an ever-changing complex of mineral matter, organic matter—both dead and living—moisture and air.

SOIL EROSION

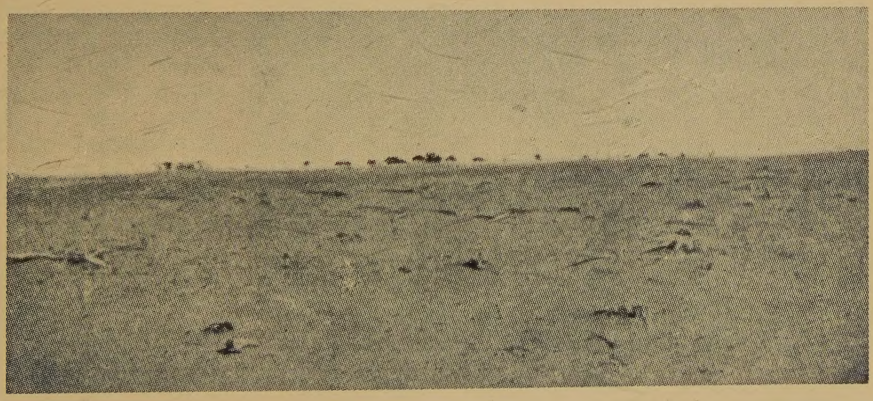
By processes of natural erosion, soil is transferred from place to place by running water and wind. Nature's protective mantle of vegetation generally allows this to occur no faster than new soil can be produced. But to meet man's need, it has been necessary to remove the natural vegetation to grow crops or pastures, and farming practices must be adopted to fit in with Nature, and so prevent accelerated removal of the very valuable topsoil. When topsoil is shifted away by water and wind faster than under natural conditions, then soil erosion—*man made* soil erosion—is in progress.

The beginning of soil erosion or declining fertility is not always easy to detect. Where soil erosion has obviously already occurred or is actively in progress, special control measures, as well as altered farming practices are frequently necessary. Where no erosion, or only slight erosion is apparent, farmers still have an obligation to themselves and to the nation to make conservation farming their deliberate goal.

PLANTS PROVIDE PROTECTIVE COVER

The natural contribution which living and dead plants make to the protection and fertility of the surface soil is the basic principle in conservation farming. This means that, if possible, the soil should not be left bare, and that crop remains should be left for surface protection and ultimate breakdown to humus, unless there is some special reason for their destruction.

Under Western Australian conditions there are few farms, except those devoted to special crops such as fruit, vegetables and tobacco, which do not carry stock. Therefore, the establishment and improvement of pastures can have direct benefit as well as contributing to soil conservation. On all soils, and in all types of mixed farming, periods of pasture are desirable. This is specially true where slopes are steep or where the soils are sandy and liable to wind erosion. Plants of the legume family such as clovers, trefoils and lupins are of special value for grazing and soil improvement purposes. As a specific example, subterranean clover is



The wind can remove surface soil where the surface cover of living or dead plants is not sufficient. Exposed stumps on wind eroded land measure the extent of the damage.

—Photo: G. H. Burvill.

a great ally in soil conservation efforts. It is best adapted to sandy, gravelly and other light soils, and some of these are the very soils most subject to water and wind erosion. Enterprising farmers are extending subterranean clover into lower rainfall areas on suitable soils, and where the annual rainfall is 14 inches or more there is ample evidence of success. Even in 13-inch rainfall areas, many farmers are giving subterranean clover a trial, and encouraging results have been noted.

SOIL CONSERVATION MUST BE A POSITIVE OBJECTIVE

Departments of Agriculture in all countries have long been concerned with offering the best advice to farmers to improve the productivity of their lands. In giving such advice, soil conservation has been implied, but it has not until recent years been stressed as a positive objective. This is not surprising in a country like Australia, and especially in a State like Western Australia, where agriculture is relatively new and where vast areas of new land have been available for development. It is also perhaps just human nature, especially in democratic countries, that our great efforts are not put forward until some major tragedy, or destruction, threatens us.

The past 20 years have seen a great upsurge of the soil conservation movement in many countries of the world, stimulated by the disastrous soil erosion which has occurred and become so apparent even to the untrained eye. The efforts of the United States of America in this direction have been particularly outstanding and have provided an inspiration to other countries.

On sloping lands contour banks and contour farming are sometimes necessary to check or prevent soil erosion. But they are only really effective if combined with good pastures and sound cropping and grazing practices.
—Photo: Government Printer.

THE SOIL CONSERVATION SERVICE

Most Australian States now have special legislation to make soil conservation and soil erosion control positive objectives. In Western Australia the Soil Conservation Act, 1945, was proclaimed on 1st July, 1946. It includes provision for a new branch of the Department of Agriculture known as the Soil Conservation Service. This Branch has now been established for over five years and its objectives as specified under the Act are:—

(a) The prevention and mitigation of soil erosion.

(b) The promotion of soil conservation.

(c) The utilization of lands in such a manner as will tend towards the attainment of the objectives aforesaid.

(d) The education of landholders and the public generally in the objectives and practice of soil conservation.

It is natural that ways and means for controlling active soil erosion should be the main problems to which this Branch has been asked to direct its efforts, but the education of farmers in the need for soil conservation as a background to their farming activities has been continually emphasised.

When the Soil Conservation Service was started in 1946, the agricultural areas of the State were experiencing the second of two successive wet winters. Those winters of 1945 and 1946 caused soil erosion by water in many farm paddocks where it had not previously been noticed, and prompted a very keen interest by farmers in soil conservation and soil erosion control. 1945 does not date the beginning of soil erosion in Western Australia. It was widespread and evident before that time throughout the State, but fortunately was not severe over great areas.

A keen and insistent demand from farmers for advice and assistance with the control of active erosion soon developed, and continues to increase, especially since the nature and effects of various erosion control methods have been available for farmers to observe in a number of districts.

It is pleasing to record the enthusiasm which has been shown by farmers in widely scattered districts in undertaking, often at considerable expense, soil erosion control works designed by the Soil Conservation Service. In doing so, naturally they have hoped to gain ultimately in the productivity and conservation of their lands, but they have also shown confidence in the Service Officers who have been devising ways and means for checking soil erosion which are suited to our soils, climate and agricultural system. A number of farmers too, have without help, or with little help from the Service, undertaken erosion control work such as contour pasture furrowing, and occasionally contour bank construction, and have creditably served their own, and the State's, interests.

Close up of a contour bank built on sloping land where run-off had caused gullies under the previous farming system. The size and capacity of the channel above the bank can be gauged from the tapes and the ranging rods which are marked in feet.
—Photo: Government Printer.

All these works serve as demonstrations for other farmers, and are keenly watched by the Service for their experimental value. It is intended to publish a guide to the location and nature of these various works so that other interested farmers may examine them.

Sloping lands in the 15 to 25-inch rainfall areas of Western Australia have the most urgent need for conservation farming practices and sound advice and help are available through the Soil Conservation Service. Besides the help of pastures and reduction in fallowing, these lands may need contour farming, and in some cases contour banks and contour pasture furrows to assist. But it should be specially noted that contour banks and furrows, sometimes thought to be the first essential in erosion control, will not be effective unless coupled with other sound farming practices.

HOW TO GET HELP WITH YOUR PROBLEMS

The Soil Conservation Service will be interested to hear from farmers who have erosion and conservation problems about which they would like advice and help. The address is Department of Agriculture, Perth. The technical staff of the Service is not large enough to guarantee quick visits in all cases, but as officers are travelling to various districts from time to time requests on hand are attended to as soon as possible.

It is hoped that the enthusiasm for soil conservation and erosion control already shown by many farmers will become more widespread and that farmers will voluntarily seek Service advice and help. In this matter it should also be known that the Soil Conservation Act contains several clauses under which landholders may be required to do, or not do, certain things to check soil erosion or promote soil conservation. It is not the policy of the Service to use compulsion unless voluntary co-operative action fails, or seems too uncertain to achieve the desired result.

Control of land clearing by regulation and a system of permits is in operation in fourteen Road Board districts extending from Koorda to Kulin and Kellerberrin to Southern Cross. Wind erosion has caused sand drifts to block some roads in these districts, and means to control clearing and land use, especially adjacent to roads, has been sought by local authorities for some time. The regulations will safeguard roads against the results of bad farming. But the farmer still has a definite obligation to himself and the State to adopt careful and suitable farming methods especially on any soils which are liable to drift if the surface becomes too bare.

Remember that the key to soil conservation is ample protective cover on the soil surface.

FARMERS

This is YOUR Journal, and it has been written, edited and presented in a sincere endeavour to give you helpful information in an interesting manner.

We would like to have your views on the Journal—to know whether you like it or whether you don't. Drop a line to the editor and tell him the features you like and don't like in this issue—or the features you hope to see in future issues.

AIDS TO BETTER SHEARING

Grinding Combs and Cutters and Maintenance of Handpieces

W. L. McGARRY, Sheep and Wool Adviser.
J. REILLY, Sheep and Wool Instructor.
M. BUTLER, Shearing Instructor.

THE demonstrations and instructional work in shearing that have been carried out in the farming areas have revealed the universal difficulty among learner-shearers in "getting a cut." Experience has shown that this absence of good cutting in handpieces has been due in large measure to the general lack of knowledge regarding grinding and the correct adjustment or "setting up" of the combs and cutters on the handpiece. Poor cutting has also resulted from the common practice of using combs and cutters that do not match, together with faulty handpiece maintenance. These and other factors leading to such poor results will be dealt with and the necessary control measures fully described.

The practical instruction in grinding, etc., which has been included in the shearing demonstrations is now supplemented by this article. To those who have attended the demonstrations the article will be very useful for reference, and to others it will be of practical assistance during their shearing operations.

THE HANDPIECE

The shearing handpiece requires to be in proper condition, if the best results are to be achieved. With care and attention gained by a study of the wearing parts and their functions, the handpiece can always be made to give good service and efficient cutting. (See Fig. 1.)

Spare Parts List.

An illustrated list of the parts and their serial numbers, of the make of the machine in use, is obtainable through the agents and will help the beginner in becoming familiar with the handpiece. Also necessary is a centre-post gauge to fit the machine.

Combinations of Combs and Cutters.

It is common to find the novice shearer using combs of a standard size with wide throw cutters and vice versa. This is a very bad practice as, unless combs and cutters of suitable combinations are used, the machine will not perform efficiently. It is essential **for the teeth of the cutter** to "time" properly on the teeth of the comb. (See Fig. 2) There are various makes of combs on the market and after selecting your combs, take care to select the **cutter that matches that particular type of comb.** Incorrect combinations cause uneven timing and the resultant shearing will be ragged. Cutters that are too wide will throw over the edge of the comb, causing possible injury to the sheep. (See Fig. 2.)

Keeping Tools Even.

It is common practice among shearers to keep their combs and cutters wearing evenly. This is a definite advantage. To do this, thread the tools on a piece of wire bent to form the letter S. Combs

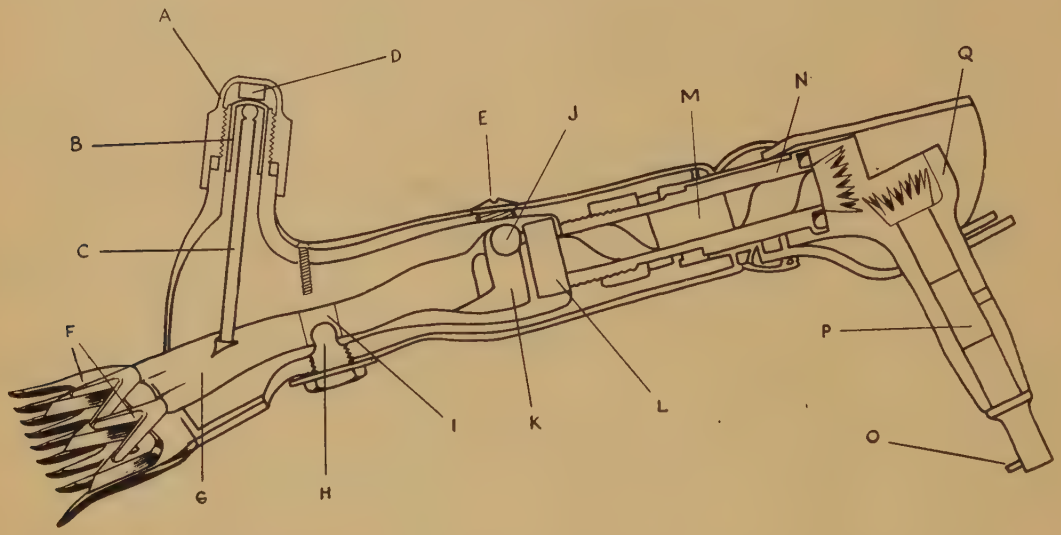


Fig. 1.—Shearing Handpiece—(A) Tension nut; (B) Tension sleeve; (C) Tension pin; (D) Crown plate; (E) Inspection screw; (F) Fork yokes; (G) Fork; (H) Post; (I) Fulcrum; (J) Ball; (K) Ball race; (L) Crank head; (M) Main spindle; (N) Bush; (O) Spindle pin; (P) Back spindle; (Q) Back joint.

on one wire—cutters on another. When loading the machine take tools regularly from one end and when ground replace them on the other end. When this method is employed the tools will wear down together and will keep a universal size, giving a much improved performance over uneven pairs. Do not mix up your combs and cutters and select them at random when changing. Remember the centre-post in your machine is set to suit even cutters.

Using Centre-Post Gauge.

It is the general practice for handpieces leaving the manufacturer to have the centre-post set in position for new cutters and they will work satisfactorily with these or nearly new tools. However, as the cutters are ground smaller, they, when fitted to machine, raise the rear end of the fork, so that the ball on the crankhead is not working in correct relation to the ball-race on the rear end of the fork. This causes incorrect pressure on fork tips. The ball-race will be revealed by removing the inspection screw. Adjustment of the centre-post is now necessary. To do this, release the locknut holding the centre-post and unscrew (or lower) the centre-post **half a turn** or **complete full turn**; now test with gauge. (See Fig. 3.) If the gauge shows that the fork is still too high, unscrew centre-post another half turn and so on until gauge indicates correct setting, then securely tighten locknut. It is essential that the centre-post be shifted a half turn or full turn at a time, as on inspection the centre-post will be found to show wear on rear side only. If taken half a turn the unworn side will become the new wearing surface, if a complete turn then the original seating will be returned. Thus to avoid an uneven (half worn and half new) position **¼ or ¾ turns must not be used.** Of course, if the reverse setting be required, when new cutters are replacing worn out ones, the post must be raised.

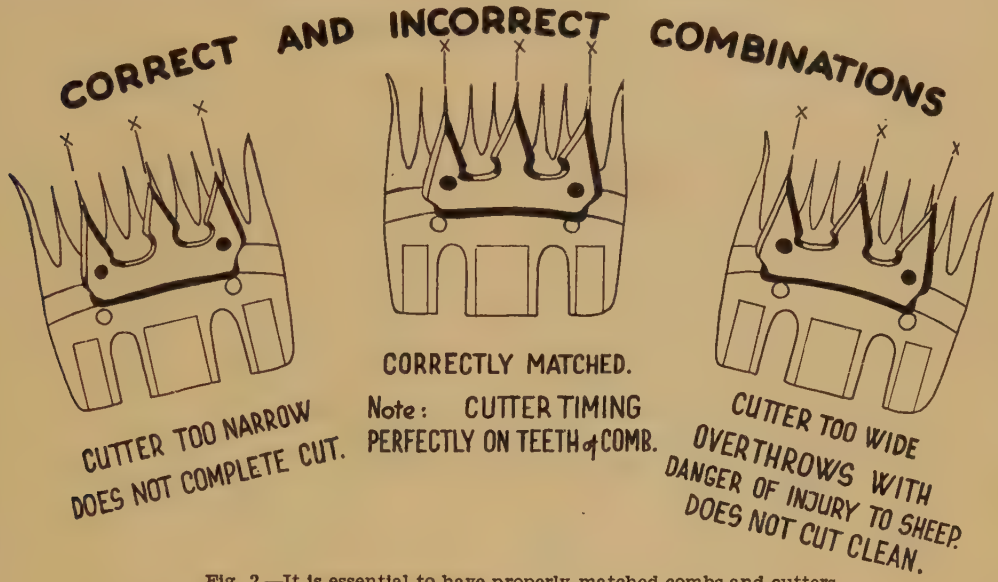


Fig. 2.—It is essential to have properly-matched combs and cutters

Wearable Parts.

It is also necessary to examine the **post and fulcrum cup** occasionally. Should excessive wear be apparent, renew both parts at the same time. After considerable use the **tension nut sleeve** will show wear on the crown; should it be developing a flat surface it is advisable to renew it, as it will be hard to obtain the correct amount of tension. **The tension nut screw bushing should be tight at all times.** It can work free, with consequent loss of tension, and will puzzle the learner shearer, as it is not readily discerned. The **fork yokes** or **chicken feet,** should be inspected. Look for wear on the pin-hole tips, for this is where the tension is exerted and where the cutting is done. Therefore, it is necessary that these parts be in proper condition and the fork yokes fitting snugly in the fork. It is also a good practice to withdraw them occasionally and insert grease prior to replacing. This will ensure that they swivel freely. At the same time make sure there is clearance at centre prongs. To remove the yokes, grip with pliers, then turn the pliers upside down and withdraw; the reverse replaces them. **Back joint cogs** should be looked at from time to time and should excessive wear be apparent, it will be

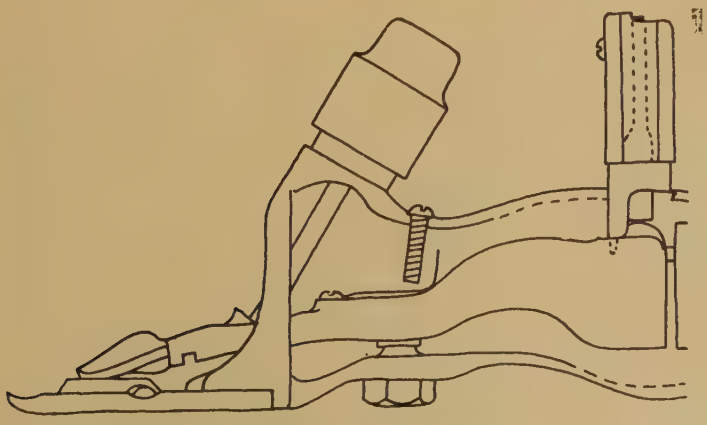


Fig. 3.—Testing the centre post

necessary to renew them, as worn cogs will not give good results. Oil these back joint cogs regularly.

"SETTING UP" OR LOADING

"Lead."

The "setting up" of the comb and cutter on the handpiece, so as to acquire the correct distance or "lead" from the points of the cutter to the points of the comb, is brought about by simply standing the comb up (see Fig. 4), when securing it on to the comb base, on the machine, so that the points of the comb are slightly (at least ¼in.) in the lead of the cutter points. (See Fig. 5.)

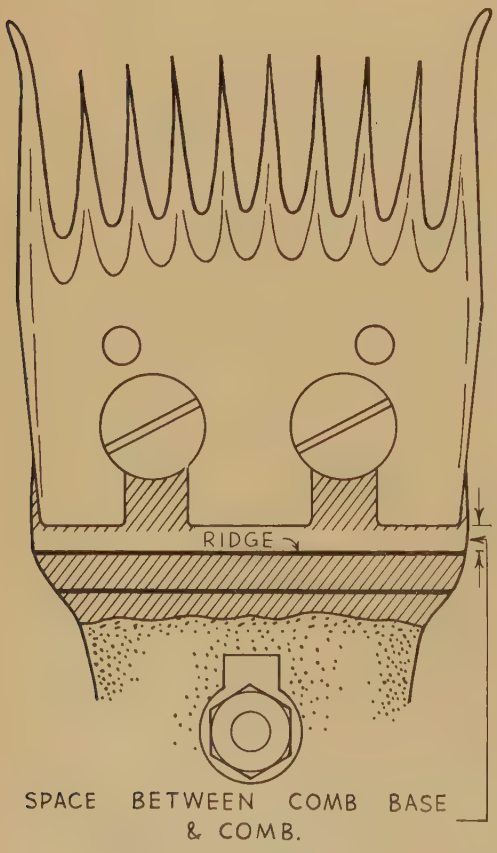


Fig. 4.—The comb stood up

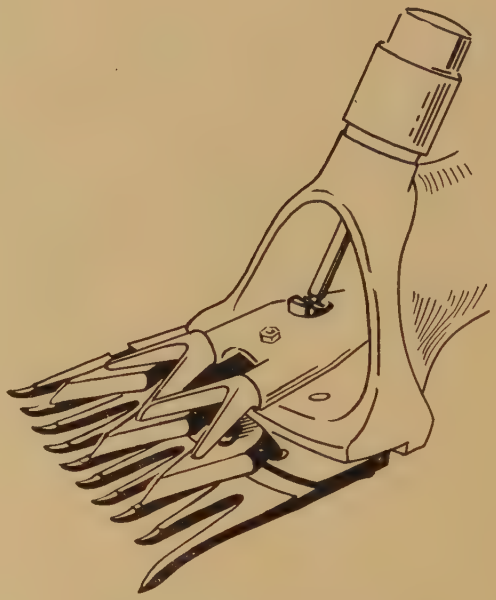


Fig. 5.—Correct comb lead

"Throw."

At the same time make sure that the cutter moves or "throws" evenly to both sides of the comb (when machine is rotated by hand), for should the cutter throw over the comb's side, particularly over the bottom tooth, there is the risk of cutting the sheep and the machine will not cut cleanly and tends to drag. (See Fig. 6.)

Precaution.

It is a wise practice to always place the right thumb on the cogs of the back joint and rotate the spindle a turn or two after loading the machine, or changing a cutter, to make sure that the cutter works freely with light tension on and that the comb is secure, for should the machine lock when put into gear it will be violently wrenched out of the hand, with probable breakage and/or injury. **Adjust the machine while it is running,** so that it has a slight tendency to roll in the hand when loosely held. This should give correct **tension** and good cutting.

Fig. 6.—Cutter "throwing over" the bottom tooth

Changing Tools.

It has been found that novice shearers are prone to use a comb and cutter far too long. This is detrimental to good shearing, as no matter how well tools are ground, they will not retain a cutting edge for long periods. More frequent changes are recommended, for once the edge is dulled, the machine will have a definite tendency to pull or pluck at the wool instead of cutting cleanly. This absence of a clean cut often escapes the notice of the learner shearer and it will cause the sheep to become restless and strain against him, causing great difficulty in holding the animal in the correct position for efficient shearing. Insufficient tools encourage the bad habit of using them too long without changing. Always see that sufficient combs and cutters are on hand for a full day's shearing. **This point cannot be too highly stressed.** The comb should be changed at least after 40 minutes in use, less in hard sheep, and two or three cutters used to the comb, irrespective of tally shorn, to keep the machine cutting efficiently. With most farm shearing, grinding is usually done at the completion of the day's shearing, and it would be necessary to have on hand at least one dozen combs and two and a half dozen cutters to ensure that sharp tools are always available.

It is far better to use more tools and less labour than the reverse. With small flocks, the tools will be available for crutching and successive shearings, because the abovementioned quantity of combs and cutters should shear approximately 6,000 sheep. **Remember, sharp tools mean easier shearing and more changing means easier grinding.**

Points to Remember.

Keep barrel of machine filled with oil.

Remove and clean tension nut and fork yokes frequently.

Release tension when oiling post and cup.

Remove spring caps on back joint and grease frequently.

Oil all working parts.

Set up with correct lead.

See that cutter throws correctly.

Check comb screws to be sure comb is on securely.

Change combs and cutters frequently.

Always have sufficient tools on hand.

GRINDING I

Magnetic Holder.

It is essential to understand what actually takes place during the grinding operation. An examination of the magnetic holder on the pendulum will show that the distance from bottom of lower magnet to bottom of pins is $\frac{1}{4}$in. (See Fig. No. 7.) This is to enable the lower magnet to take over at the "line of balance" of the comb or cutter. A further examination of the magnetic holder will also show that the bottom pole is slightly in advance of the top pole. (See Fig. No. 7.) The reason for this difference in position of the two poles is to ensure that the comb is on a backward slope until it strikes the disc, thus presenting the **heel** of the comb first, and

makes certain that the **points** withdraw immediately before the heel, after grinding. As the comb strikes the disc it leaves the top pole and is taken over by the bottom pole alone, at a point on the comb known as the "line of balance."

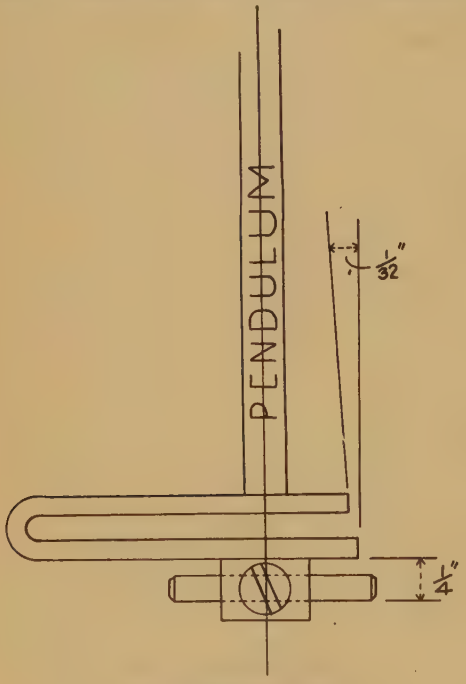


Fig. 7.—Magnetic holder

"Line of Balance."

The "line of balance" is situated ¼in. above the bottom of the pin holes. (See Fig. 8.) This results in the comb being ground **slightly** to the heel, which is a good practice. To make the "line of balance" somewhat clearer, place a foot rule on the table, applying pressure at 6in., in this case, "the line of balance." It will be noticed that the pressure on either end of the ruler is uniform. Now shift the pressure point to 8in. and the ends of the ruler will indicate very different degrees of pressure. Magnets and pins which are correctly set by the manufacturerers, should not be altered. If alteration has occurred by filing one or other of the magnetic poles or bending the pendulum rod, etc., correct adjustment should be made before grinding.

Checking Pins.

Check, and if necessary, reduce the diameter of the pins to ensure the necessary freedom of movement of the comb or cutter being ground. The comb or cutter should not be held too rigidly by the pins or damage may result.

Clearance Groove.

Combs when new have a groove across the face, known as the clearance groove. The purpose of the groove is to clear any steel and emery particles, which come from the area below it, during grinding. This groove with its clearing effect allows a new starting point for grinding the upper or teeth area. Certain parts, it will be noticed, are removed or gulleted out of the bottom of the comb. This serves to bring the grinding areas above and below the "line of balance" into correct relation for even grinding. Thus, when the grooves are ground out, the balance is then uneven, and combs will quickly grind to the points, become pricky and are at a stage where they need to be replaced.

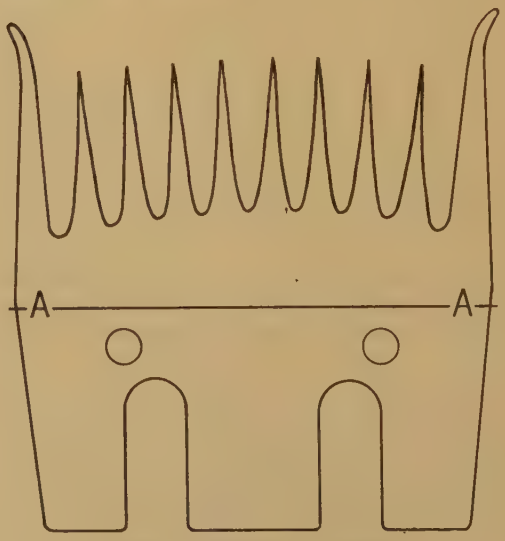


Fig. 8.—The line of balance

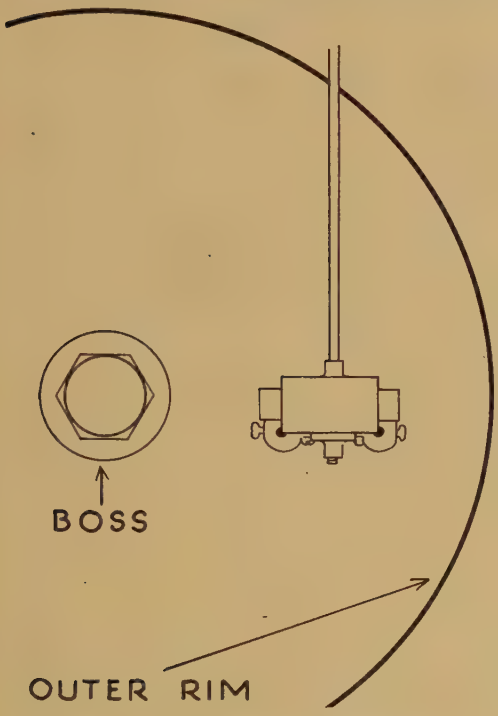


Fig. 9.—Correct pendulum adjustment

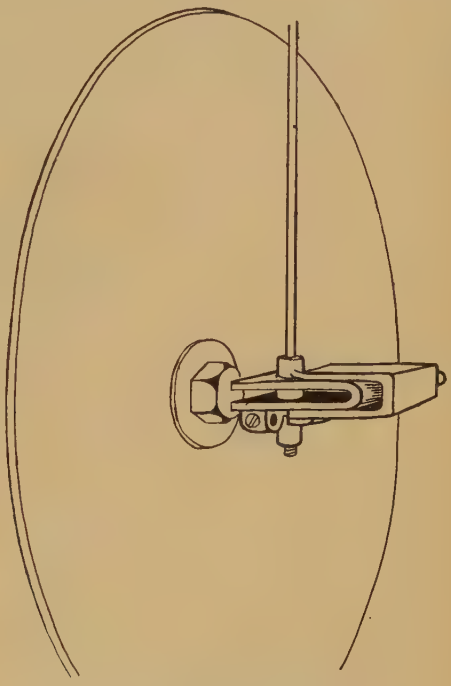


Fig. 10.—Correct height adjustment

Adjusting Pendulum.

The pendulum should be on that side of the disc that rotates upwards and is hung at a point midway between the boss and outer rim. (See Fig. 9.) Next raise or lower pendulum by means of the screw thread until, when taken across the disc, the centre of the magnets are level with the centre of the spindle. (See Fig. 10.) The grind will now be straight up the teeth when finishing (sharpening) the comb. Now place a comb on the magnet and adjust the pendulum, so that the comb hangs just clear of the disc face. (See Fig. 11.) A similar setting will be suitable for cutters, but care should be taken to finish grinding at a position on the disc where the **sparks fly straight up the teeth of the cutter**—just off centre of disc. (See Fig. 12). This is most important, for if the grind is across the teeth, unsatisfactory results will follow.

GRINDING II

Light.

It is **most** important that the grinding be done in a good light. It is impossible to sharpen combs and cutters correctly unless they can be **seen** properly during the process of grinding. The need for good lighting cannot be too highly stressed, because in an inferior light it is not possible to see the minute blunt, dull white edge on the tools and as a result they can quite easily be underground or overground. Poor cutting is inevitable with both overground and underground tools.

The installation of adequate skylights or replacement of sheets of iron with corrugated perspex, etc., at the position in the shed where the grinding is being done, will greatly improve the light.

The bulk of shearing in the farming areas is done when the days are short and often cloudy. For this reason it is

recommended that grinding be carried out at mid-day instead of the usual practice of doing the daily grinding at the end of the day's shearing.

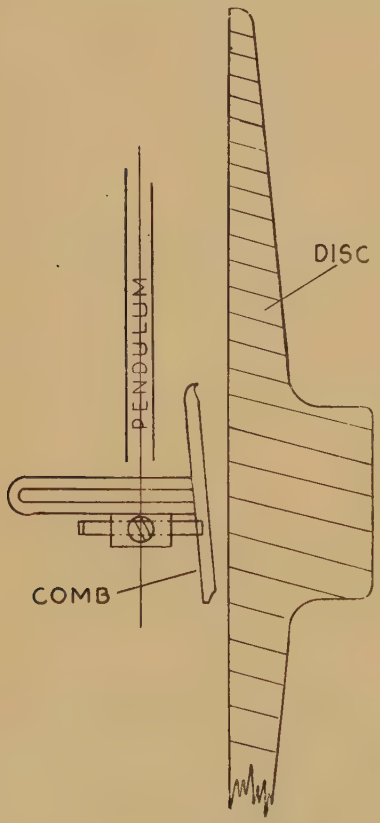


Fig. 11.—Comb hanging clear of disc face

Grinding Speed.

It has been observed that due to various reasons the disc speeds of many small plants in the farming areas are too slow for efficient grinding. Slow speeds require heavier pressure on the disc which results in an unsatisfactory coarse deep-scoring grind. Heavy pressure can also overheat and burn the points of the tools and feather the cutting edges. When light pressure only is exerted on slow running discs, the tools will not be sharpened but only polished.

The speed of the discs should be 2,400 to 2,500 r.p.m.

Check disc speeds with a revolution counter.

Value of Clean Tools.

After tools have been used, they should be thoroughly washed and dried and freed of all yolk, grease, etc. Particular care of pinholes is necessary to ensure that foreign matter will not be transferred to the emery. Clean out any emery particles that collect in the cutters during grinding as these, when a cutter is placed on a handpiece, and oil applied, form into a grinding paste and help destroy the edges.

Blunt Tools.

When a comb has been used for some time it will be seen that the cutting edges of the teeth, particularly towards the points, are rounded, and when the comb is held side-on in a good light, white or dull lines are seen on the edge of the teeth. Combs must be ground **only** until this dullness completely disappears and is replaced by a keen sharp edge. **Do not overgrind or overheat.** Cutters will be examined and treated in the same manner.

Grinding Combs.

When grinding, place comb squarely on the disc halfway between boss and disc edge, then, standing back and using both hands, exert a light and even pressure, moving the comb backwards and forwards pendulum fashion, across the emery. (**Do not hold comb on disc more than five or six seconds at any one time**). This movement across the disc, will have the effect of grinding the comb but not **sharpening** it. When the comb is sufficiently ground, which is only determined by examination, hold the comb stationary against the disc, then, with the sparks running straight up, **momentarily**

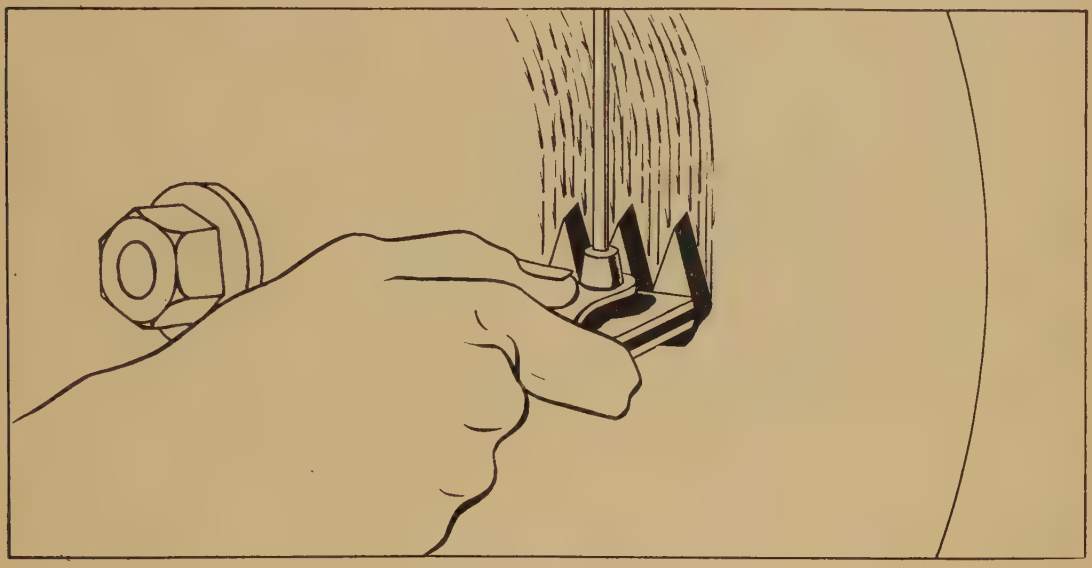


Fig. 12.—Sparks should fly straight upwards

give slight extra pressure, until the sparks curl in slightly towards the centre of the comb. This will produce a fine, sharp cutting edge and also have the effect of hollowing the comb slightly, so that friction between comb and cuter while working is somewhat minimised. Too much pressure will turn or feather the edges. Be light handed and good results will be obtained. The correct stance (and the most comfortable) is to stand squarely on to the grinding face and use the arms in the movement across the disc, not the restricted movement to be had by using the wrists only.

Grinding Cutters.

Grind cutters on the fine emery. They require much lighter pressure than combs, owing to the small area of steel presented to the disc. Some grind with one hand, but two hands may be used if sufficiently light pressure can be obtained. Move the cutter lightly backward and forward across the disc face, then momentarily pause at the position where the sparks fly **straight upward,** then withdraw. This will give the cutter a fine sharp edge. Be careful not to overgrind or the edges will be turned or feathered, and as a result will not cut cleanly but only break the wool.

Points to Remember.

Use only light and even pressure.

Heavy pressure tends to overgrind and burn tools.

Examine tools frequently during grinding.

Do not use worn discs.

Renew the emery frequently.

Making up a Disc.

Be sure that discs are cleansed thoroughly, using a brush and hot water and allow to dry by evaporation only. Next cut a hole in the centre of the emery cloth to take the stud on the clamp, then place the cloth over the clamp plate, emery inwards. Now paint the glue evenly and thinly on the disc, taking care glue does not run into centre recess, and then fit the prepared disc over the clamp on to the emery. Turn disc on cloth to squeeze out surplus glue, and screw down securely. Allow glue

sufficient time to dry (at least four hours) then trim away edges with a **sharp** knife, being careful to cut with the pressure on the knife against the emery wheel and not against the clamp. This will ensure that the extreme edge of the emery will not be lifted during cutting. Do not forget to remove small portion of emery cloth in centre boss.

Grade of Emery.

The most suitable grade of emery cloth for grinding combs is No. 40, which is the correct degree of coarseness. Finer grades are not satisfactory as the resultant finish is a polish not a grind. For grinding cutters a finer emery cloth is used, No. 80 being the most suitable. Always be sure to obtain emery with the cloth backing.

Holding Handpiece Correctly.

An important factor in shearing is to hold the handpiece as far back as possible using the thumb and index finger more as a guide than a grip, and lightly gripping the barrel with the other three fingers. (See Fig. 13). This will give better control, longer reach, less wrist movement, and a freer range of movement, enabling the shearer to correctly place the machine in any desired position on the sheep and to follow the curve of the sheep's body closely. This light grip on the machine will be helpful in eliminating ridging or "weather-boarding," and will reduce second cutting by allowing the bottom "or lower" teeth of the comb to be held down on the skin at all times. It is common practice among novice shearers to hold the machine far too rigidly, with the thumb and fingers encircling the handpiece completely. (See Fig. 13). This not only restricts the range and free movement of the machine, but will not allow correct placing; it also tends to result in bad shearing and causes undue strain on the muscles of the forearm. It is advisable to become thoroughly familiar with the holding of the handpiece while it is running, before attempting to shear. Remember that the wool is to be **shorn** off and not **pushed** off.

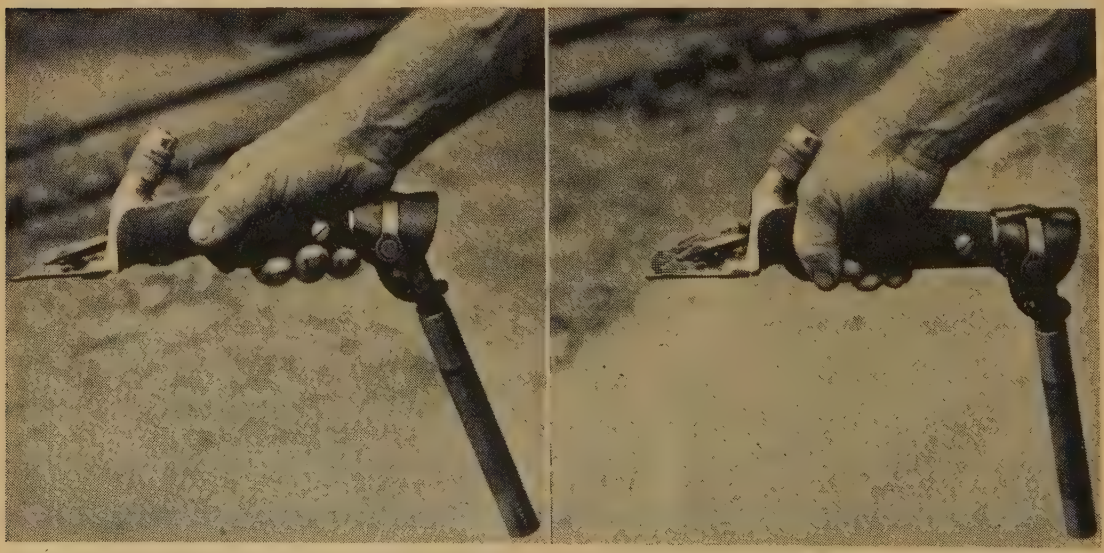
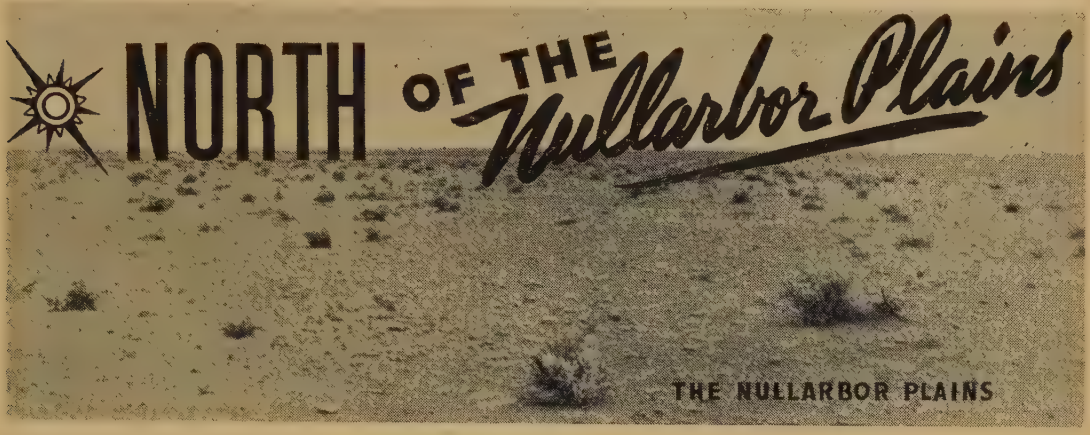


Fig. 13.—Left—Correct grip of handpiece. Right—An incorrect grip which is all too common

NORTH OF THE Nullarbor Plains



By A. R. TOMLINSON, Chairman Protection Board,
and
C. K. BLAIR, Vermin Control Officer.

FOR a few hardy dingo-trappers—experienced bushmen able and willing to endure the rigours of a nomadic existence in almost waterless country—the area to the north of the Nullarbor Plains has long been a favoured hunting ground. In the 1949-50 season bounties were paid on about 3,000 dingo scalps from this area.

The numbers of scalps obtained varied from year to year according to seasonal conditions. If the season on the plains was good following a spell of wet weather the numbers of scalps increased, particularly if this coincided with harsh conditions further inland.

The Vermin Control Branch has watched this situation with interest especially in view of the fact that complaints of inroads by wild dogs in the areas to the west of the plains have recently become more prevalent. Information obtained from trappers indicated that, although some dogs were breeding on the Nullabor Plains, there appeared to be a definite seasonal influx of dogs and half-grown pups towards the end of each year. It was also learnt that the movement of the dogs was always southerly and westerly and that no northerly travelling was observed at any time. Most successful trapping took place to the north of the Trans-Continental Railway Line.

The Agriculture Protection Board recently agreed to a proposal put forward by the Chief Vermin Control Officer that a motorised expedition should be organised and suitable vehicles and equipment should be purchased to enable a reconnaissance of this area to be made. It was proposed that the expedition should travel about 200 miles north of Rawlinna and then turn eastward to the South Australian border.

VEHICLES AND EQUIPMENT

It was decided to obtain a large vehicle to act as a mobile base and a smaller vehicle to do the scouting. The large vehicle would carry all necessary supplies of petrol, fuel, food and other materials.

As no large "four wheel drive" vehicles were available, it was decided to obtain an "International" five-ton truck with eight gears (including four "crawler" gears).

A Willys jeep was obtained for reconnaissance purposes while a trailer, which was interchangeable between the two vehicles, was also included.

The large truck was equipped with the most up-to-date type of radio transceiver through which contact was constantly maintained with Kalgoorlie. Water was carried in a 200-gallon tank and smaller containers. Brisket fat and strychnine were taken for bait manufacture.

PERSONNEL

Owing to the possibility of water shortages, it was necessary to restrict the party to four members. These were Mr. C. K. Blair, the Vermin Control Officer in Charge of dogging operations in outer pastoral areas; Mr. W. G. Bartlett, a Protection Board dogger; Mr. H. C. Carlisle, a former resident of Rawlinna, who had extensive experience in dogging on the Nullarbors, and a local native to act as guide. Unfortunately, the native declined to go at the last minute and the party was forced to leave without him.

ROUTE TRAVERSED

The party travelled north-east from Rawlinna via Seemore Downs, Endeavour Bore and Yellowtail Bore to a point approximately 74 miles north of the Transcontinental Railway line to west of Lake Nyanga. This locality was approximately 28 miles north of the Nullarbor Plains. Travelling became difficult beyond there owing to the powdery nature of the sand, the thickness of the myall scrub in parts, and the sandhills a few miles ahead. Clear indications were seen of the passage of dogs over many years up until recently. No water was seen, but innumerable dog signs in the vicinity of dried claypans and blowholes indicated that water would be held at these places at the

1. A native dam among the Myall and Bulloak country

2. Camp No. 9 north of Reid on the edge of the Nullabor Plains.

right times. The tracks to this most northerly point came from the general direction of the Warburton Ranges and were confined to a course up to 20 miles wide in parts. Two points of interest are that in 1949, when the last major influx occurred, over 500 dogs were trapped or shot there in a period of a few weeks, and that Mr. Carlisle had previously travelled 160 miles further inland to the vicinity of Mound Springs and found dog signs abundant along the whole route.

As it was impossible to travel eastwards from this area, it was necessary for the party to return to the Nullarbor Plains before turning in that direction. Dog tracks were noticed up to about 30 miles then no more were encountered for 60 miles, when the second "lead in" started.

This was followed for a distance of approximately 100 miles north of the Nullarbor Plains (170 miles north of the Trans. Line). The most northerly point reached was on a north-westerly exploratory trip beyond Lake Jubilee, when high sandhills prevented further travelling.

The course of the "lead in" was followed and exploratory trips to the north-east and north-west indicated that the dog migration also came from the north-east in the general direction of the Warburton Ranges. When high sandhills blocked further travelling in this direction, one of the sandhills was climbed on foot and glimpses of lake country were seen beyond. Dog signs were plentiful and some were very old.

Once again the nature of the country prevented eastward travelling so it was necessary to return southward before continuing east near the edge of the Plains. The next northerly probe was made 95 miles further east and about 15 miles from the South Australian border. No dog signs were seen in the easterly travelling.

Although the heavy truck could not be taken all the way, the party travelled in the jeep to Boundary Dam, which is approximately 100 miles north of the Trans. Line. No dog signs were seen during this trip and as a matter of fact the only indication of game encountered was one kangaroo pad.

HISTORICAL INTERLUDE

Near Boundary Dam, the party camped on the site of a near-tragedy which occurred over half a century ago.

In 1896 Mr. Arthur Mason was commissioned by the West Australian Government to ascertain the extent of the rabbit invasion, following upon reports of the rodents having crossed the South Australian border in their western penetration.

3. Members of the expedition on the site of Arthur Mason's camp where his camels were stolen in 1896. Note the damaged water drums, buckles and other metal fittings picked up on the camp site.

Leaving Kurnalpi on June 17, 1896, with three white men, eight camels and some native guides, he travelled to Yayoudle Rock Hole from which he set out with one white man, a native guide, a dog and three camels for Boundary Dam about 230 miles in a north-easterly direction. Boundary Dam, described as a small native well, was located by Ernest Giles in 1875 on his trip from Adelaide to Perth.

When camped about ten miles west of the well, Mason's native guide, apparently in league with "bush" natives, disappeared taking the three camels and a quantity of rations. Carrying eight gallons of water, papers, compass and rations—a total of about 70 lb. each—the two white men, Yonge and Mason, set out to walk 160 miles over waterless country to Eucla. When their food was exhausted they shot and ate their dog, and at one stage they were 40 hours without water before finding a small gamma hole which saved their lives and enabled them to complete the journey.

Mason was forced to abandon his tents and equipment at the Boundary Dam Camp and the motorised expedition found his water drums and numbers of metal fittings from camel saddles as well as small screws from his theodolite and other instruments. Natives had apparently smashed the equipment but the dry atmosphere had preserved the metal from corrosion.

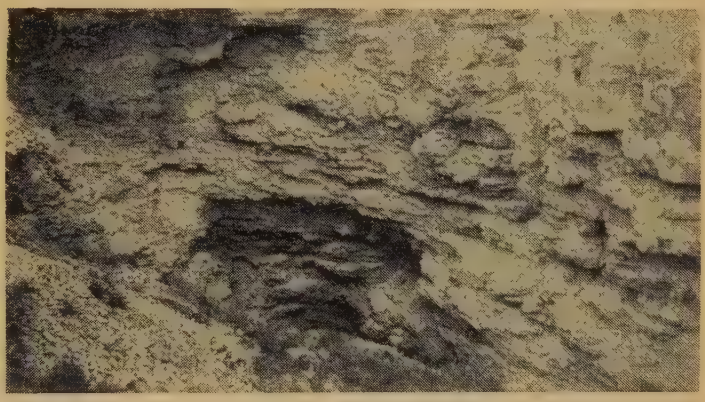
BAITING

The expedition then journeyed southwards to the coast at Eucla and westwards to Norseman. During this travelling very few dog signs were seen excepting in the proximity of water catchment tanks about 70 miles east of Balladonia. Here once again the clearly defined migration trail was encountered continuing in a south-westerly direction from Rawlinna towards Israelite Bay on the coast.

During the expedition 15,000 brisket fat baits, containing alkaloid strychnine tablets, were distributed. The carcasses of 30 kangaroos were poisoned with alkaloid strychnine.

LACK OF WATER

An extraordinary feature was the ability of some wild dogs, kangaroos and rabbits to exist where no water is apparent. Even where these animals were fairly numerous in the drier, northerly parts covered by the expedition, pads and other signs, which are the usual indications of water, could not be located. Mr. Carlisle stated that he and others who have had much experience in this area have often remarked on this unusual feature, when conditions have been at their very driest. It is difficult to believe that the animals —particularly the carnivous dogs—are able to exist for long periods without water. Nevertheless, it seems that they must be obtaining their moisture from some source other than normal water supplies. It is hoped that it will be possible to investigate this aspect more closely in the future.



4. A cave on the Nullarbor Plains.

SUMMARY

(1) While the expedition did not locate the actual breeding grounds of the dogs, it did discover the migration routes by which dogs pour on to the Plains from inland hunting grounds.

(2) There are two well-defined routes which dogs follow through the sandhill and scrub country from the general direction of the Warburton Ranges. The country north of the Nullarbor Plains is so difficult to traverse that the dogs are confined to well-defined limits.

(3) The main route is approximately 20 miles wide and runs in a south-westerly direction through Rawlinna to the coast in the vicinity of Israelite Bay.

(4) The second trail is north of Loongana, about 90 miles east of the main route, and is approximately 10 miles wide. It appears to join the main route south of the Trans. Line.

(5) While occasional dog signs were seen over most of the Nullarbor Plains, it seems that these are from strays left over from the seasonal migrations. The general movement is south-westerly and then westerly.

(6) A logical explanation of the movement is a migration of the dogs from the harsh inland conditions towards food and water. This is particularly evident when good seasonal conditions on the Nullarbors result in increases in the rabbit population and the presence of water. Some of the dogs would continue to travel southwards while others, particularly the females while whelping, would remain in the vicinity of food and water. They would gradually be driven south along the defined routes by the progressive drying-up of water supplies as summer advanced.

(7) Now that the main routes have been pin-pointed, the Agricultural Protection Board will be able to arrange for

them to be closely watched and dealt with adequately at the most suitable time of the year, i.e., September-October-November.

(8) Rabbits were noticed over most of the Plains country covered, and they were plentiful in some spots, particularly in the vicinity of Rawlinna. They were seen throughout the northerly exploratory trips and extinct warrens were visible extending into the scrub beyond the Plains.

5. Using a tree as a look-out.

(9) The apparent ability of some of the dogs, kangaroos and rabbits to exist for long periods without access to usual sources of water is a remarkable feature, which requires further investigation.

DAILY DIARY OF THE TRIP

By C. K. BLAIR.

Nov. 16—Travelled from Kalgoorlie 103 miles to Bullock Rocks N.E. of Karonie Downs Station. Saw four kangaroos and evidence of two dogs at Jumnama Rocks.

Nov. 17—After leaving Bullock Rocks went to dam three miles east of there. Saw motor cycle tracks where somebody had been laying poison baits and found a new satchel which had been forgotten. Found later that it belonged to new Australian at Coonana. Tracks fairly rough all day. On arrival at Zanthus I travelled to Cundulee Mission to secure a native guide familiar with the country north of Rawlinna. After meeting the principals we went to the native camp with them as we were told either Binki or Tommy would accompany us. After a "wongi" lasting over an hour Tommy reluctantly agreed to come with us but at last minute he decided that the weather was too hot and water might be scarce, consequently we were forced to travel without a guide.

Nov. 18—Camped in some spinifex wastes last night. Red dust and ants plentiful, hence an early start for Rawlinna at 5 a.m. Shot the first kangaroo on edge of Nullarbor Plains. Took hindquarters for meat and poisoned remainder of carcass. After travelling 97 miles arrived at Rawlinna 11 a.m. in a terrific dust storm and a temperature of 110°. Made camp in a "donga" or depression in the plain in order to have a little shade. These depressions usually carry timber such as mulga and sugar trees.

Nov. 19—Bartlett checking and greasing truck while Carlisle and self travelled in a north-easterly direction in the jeep. Inspected a covered-in rock hole 12 miles from camp, another rock hole 15 miles further on and then another 27 miles away. Not much water in any of the holes but numerous old dog signs at the second and third rock holes. The hard limestone country makes it impossible to see tracks but the dogs congregate at rock holes and large quantities of dung are found near these points. Saw numbers of rabbits and numerous eagles apparently living mostly on rabbits.

Nov. 20—Bartlett and Carlisle went to No. 2 rock hole where we had left baits. No dogs had apparently returned to the rock hole

since the baiting. They reported locating a "donga" where pups were camping but were unable to find the pups.

Nov. 21—Loaded petrol and left Rawlinna 9.30 a.m. and travelled to Endeavour Bore where we filled tanks with 300 gallons water then proceeded to Yellowtail rock hole where we camped. North-west wind, very dusty, and temperature of 104°. Cool change from south in afternoon but blew cool all night. Two dingoes were around camp last night as we found fresh scratchings.

Nov. 22—Travelled east and south-east for 92 miles, past several rock holes and crossed over a peculiar depression in the Myall country running in north and south direction. Went to two blow-holes and saw three dingo pups at first one but they went underground immediately. These blow-holes are fairly common here and appear as caves or crevices through which strong current of air issues from ground. They probably lead to extensive underground caves which may contain water.

6. A blow-hole which sheltered a litter of dingo pups.

Saw odd dog tracks all day and poisoned likely camping places and beats. Saw two wild camels 30 miles east of Yellowtail rock hole and a white owl in No. 2 blowhole.

Nov. 23—Travelled north to edge of Nullarbor Plain—thence a further 27 miles north through Myall and Bluebush country before coming to another plain where several blowholes were seen. Travelled a mile north-east to several dry claypans which would hold water for considerable period after rains. Saw 11 kangaroos in the Myall scrub but too wild to shoot. Blowholes and claypans on this northern plain showed ample evidence of dog scratchings and droppings—some only about a month old. No further signs were seen.

Nov. 24—Travelled north-easterly direction for 124 miles. All excellent travelling. Saw few rabbits, two dog tracks and two kangaroos. Shot one for meat. It blew a gale last night and everything was covered with dust this morning.

Nov. 25—Cold southerly blowing all night. Travelled 56 miles locating old track running north from No. 3 camp. Left plain country and entered heavy Myall country through which we travelled 120 miles before coming to a Mulga and Bluebush belt. Still very heavy going and truck travelled 56 miles mostly in reduction gear. Jeep following until 5.30 p.m. when we had our first puncture and decided to call it a day. Saw numerous kangaroos bordering the Plains belt—shot three—kept tails and poisoned carcases. Rabbits only seemed to come along the Plains belt and from then on all that can be seen are old rabbit bones on burrows that have not been used for a long time. All the rare isolated trees carry plenty of old dog signs but no fresh evidence seen today.

Nov. 26—After travelling four miles through Myall came to western edge of some lake country thence into heavy Mulga where we had the first puncture with the truck. A mile further we got stuck and had to do some digging and scrub cutting. Struck lake country bordered by gypsum dust. This was our No. 5 camp and we travelled 20 miles by jeep on a bearing of about 55° until we reached sandhills up to 100 feet high. Climbed these on foot, and with binoculars can see other sandhills still taller about 15 to 20 miles north. Between these points saw some more lake country and on return to camp shot two grey kangaroos, the first we had seen in these parts. Old dog tracks seen throughout the whole trip today and saw one fresh track of a lone dog and tracks of five kangaroos today. These animals seem to be able to live without water.

Nov. 27—Travelled 42 miles through gypsum lake country and a lot of Myall and Mulga. Located a native dam at a claypan. Numerous signs of an influx of dingoes over a number of years. Believe there is a permanent water known as Bilgie about 35 miles north-west of the claypan. Will endeavour to locate it tomorrow.

Nov. 28—Travelled north-north-west about 35 miles. Hauled trailer 18 miles to dry native dam known as Coolgubbin, thence a further 15 miles before returning to camp No. 6. Slow and heavy going but intend taking truck to where we broke trail and endeavour to locate permanent water at Bilgie. Travelled through Myall, Mulga and Bluebush, also Spinifex, Mallee and over numerous sandhills. Saw no game at all today and very few old dog signs after leaving the native dam. Was unable to locate Bilgie.

Nov. 29—Travelled north 16 miles through undulating sandhills. Very heavy going with much gypsum dust and then entered Myall and Mulga country. No game whatever today and we appeared to be off the "lead in" used by dingoes travelling from breeding grounds farther north. High sandhills as far as one can see with binoculars through a look-out in a high tree. Had two punctures today with the temperature around 107°.

Nov. 30—Travelled four miles west this morning and struck more large sandhills with others extending for many miles norhward. Returning to camp No. 7, packed up and returned to truck which we left at camp No. 5. Temperature around 110° today.

Dec. 1—Left No. 5 camp 6.30 a.m. but by 9.30 had only travelled two miles. Once a vehicle breaks the top crust in this country the wheels are in fine sand with no bottom, consequently we had to use mulga rails and coconut matting constantly. Travelled to edge of plain country covering 56 miles through the day. Temperature about 107° with the wind behind us. Saw seven kangaroos—shot one for meat and poisoned balance of carcase. Dog signs now getting more frequent.

Dec. 2—Travelled south 35 miles from camp No. 9 to small rock holes and went around several dongas. Old dog signs not so frequent in that direction. Saw four kangaroos. Overcast all day, humidity and temperature again high. Made up 1,500 baits this afternoon.

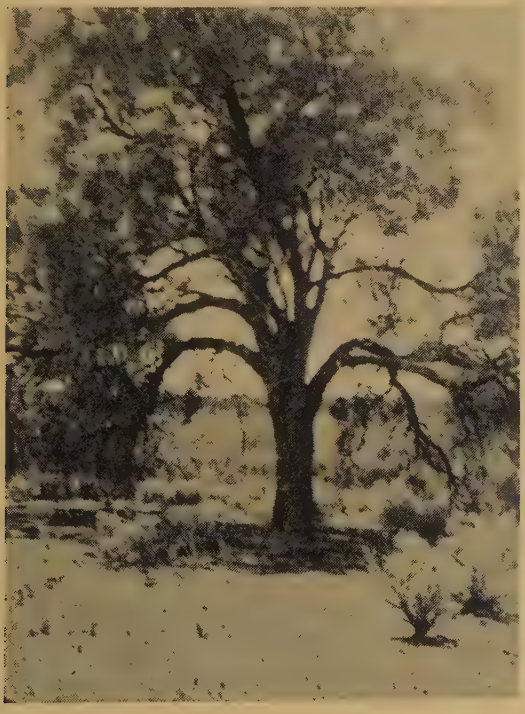
Dec. 3—Travelled on 95° bearing for 62 miles today firstly through broken plain country then into the Myall again before coming to some Mulga flats where numerous kangaroos were seen. No dog tracks or old signs could be found and it appears that at least one "lead in" from the Warburton Ranges has been passed. Wind behind us and temperature well over the century mark made it very heavy going. Motors boiling, decided to strike south-east to the edge of the Plains again. Petrol consumption for the truck today was four miles to the gallon, jeep 12 miles. Poisoned several kangaroo carcases.

Dec. 4—Travelled on bearing of 60° but struck heavy going along Myall country so decided to again travel south-east to edge of plains which we struck after 20 miles of travelling. Total mileage today was 61 miles. Saw several fresh dog signs and numerous kangaroos. Shot three for meat and baits. Chased an old man kangaroo with a jeep and bailed him up. Bartlett approached him with a stick and the kangaroo showed fight. Bartlett dodged backward and tripped over a bush so that he finished with the kangaroo on top of him before a shot ended the contest. Got a couple of photographs but missed the best snap of Bartlett and kangaroo mixing it. It was a big red kangaroo weighing 102 lb. Temperature still averaging well over 100°. Hope to get a datum point tomorrow to hit the border before turning north to Boundary Dam.

An old man kangaroo bailed up and ready to fight.

Dec. 5—At 4 a.m. several parrots settled at foot of my bed and also in the jeep. Travelled 40 miles on bearing of 140° to edge of plain. According to the map our bearing by compass had gone haywire somewhere so decided to travel south-west to Trans. Line for check. Found we were 12 miles further south than thought but edge of plain is 15 miles further south than marked on map. Our No. 12 camp is where Mason camped on August 16, 1896, when seeking to retrieve equipment left near Boundary Dam when native stole his camels. We found remains of old satchels.

Between here and Reid, open plains with not a tree for miles. The "snifter" trees have gone but the dogs make use of any



8. Isolated trees such as this are surrounded by ample evidence that they have attracted dogs for many years.

conspicuous limestone rocks. Very few old dog signs over this area. We are now 15 miles west of the South Australian border and 60 miles south of Forrest Lakes and Boundary Dam. Terrific dust storms in the afternoon and temperatures high as usual.

Dec. 6—Travelled 60 miles north towards Boundary Dam but only proceeded 20 miles with truck before being bogged in sand, so packed jeep and trailer and did further 40 miles. Heavy mulga country all the way—very hot and no tracks of any animals after leaving the plain. Crossed an old dray track travelling north-west. Think it was made by Fairley and Woolley about 70 years ago. These two men travelled north from Eucla

9. On the treeless plains conspicuous rocks attract dogs from far and near.

with native guide looking for pastoral country and since then nothing has been seen of them except remains of the dray, harness and equipment which were discovered by a search party. They probably fell victims to native treachery.

Dec. 7—Travelled north for nine miles through mulga scrub into Bogada sandhills and Bulloak country and came upon Arthur Mason's camp where he left all his gear when natives stole his camels on July 25, 1896. Natives had knocked holes into the water drums and broken up everything but we found a number of screws, metal fittings such as buckles and portions of equipment. We then struck off on a bearing of 70° and after two miles came to saltpans and lakes which are big depressions surrounded by sandhills. No old or new tracks of dogs or other animals to be seen and I think we are the only living thing between here and the Trans. Line. Decided to head south to Reid siding.

Dec. 8—Arrived at Reid where we picked up fuel supplies and had a bath. There are bores at Reid and water is treated there for the Trans-Continental Railway to be used at Forrest and Cook. Travelled along the Eyre Highway on top of a cliff. Saw a fair number of rabbits on edge of plain today. Very little evidence of old dog marks though the cliffs could give shelter to pups.

Dec. 9—Went down to Eucla from the cliffs this morning and returned to travel along top of cliffs to Weebulli Caves. Thence along all rock holes to Mundrabella north boundary. At rock holes saw several old signs of dogs and two signs of visits within last 24 hours. Shot a white owl at the caves and am salting it to take to the Museum. Had a good run today.

Dec. 10—Travelled westerly past several rock holes to Madura. Truck also travelled along foot of cliffs inspecting rock holes, but no old or new signs of dogs or any evidence of game. Travelled further 30 miles west from Madura before making camp. Travelled 151 miles today.

Dec. 11—Travelled past numerous rock holes to Cocklebiddy Tank and down to Twilight Cave on the coast. Saw two fresh dog tracks at water holes which contained the first fresh water seen since leaving Rawlinna on November 21. Laid baits near all rock holes but have seen no evidence of any old dingo beats although odd dogs have visited them at some time or other. The coast road consisted of nine miles of white sandhills—quite a change from the red ones encountered up till now. Our salted owl did not stay the distance and was jettisoned as too "lively" for comfort.

Dec. 12—Travelled around to visit a further eight rock holes then along the old original East-West road. Baited all rock holes. Two holes contained water and we saw old dog signs and an occasional fresh track. Truck proceeded along Eyre Highway.

Dec. 13—Visited two more rock holes where we saw two fresh dog tracks. Further along saw the dogs that made the tracks and Bartlett shot one but the mate went bush. Have taken the whole skin of this dog for presentation to the Agriculture Protection Board as the most valuable fur in Australia. It took three good men five weeks to get it. Numerous old dog signs along this route. Trees and conspicuous places showed scratching and dung. This appears to be the old migration area from north of Rawlinna to the Esperance-Norseman area. Three flat tyres this morning so spent afternoon mending punctures and checking up the jeep and the truck.

Dec. 14—Travelled along Eyre Highway and reached Norseman at 5.30 p.m. where we had a much needed clean up and shave.

CHAINS TO THE ACRE

Have you ever wondered how many chains you must travel with an implement to cover an acre of ground? Here is a simple solution to the problem.

Simply divide the width of the cut (in feet) into 660 and the answer is there without any headaches. For instance, if the machine has a 10ft. cut you travel 66 chains to cover an acre. A 6ft. binder would travel 110 chains and a plough with a 4ft. cut would travel 165 chains. A chain, of course, is 22 yards, and there are 80 chains to the mile if you are interested in working out the daily or weekly mileage travelled.

SOME INSTRUCTIVE FIELD DAYS

By "MARTINGALE"

ALTHOUGH fully conversant with the old newspaperman's adage which states that "Yesterday's news is the bath-heater fuel of today," we make no apology for including these reports of field days held after our December issue had gone to press. It is felt that they contain some useful lessons which, even at this late date, are deserving of emphasis.

This applied particularly to the field day organised by the Horticultural Branch at Mullalyup on December 6, when about 100 orchardists gathered to witness a demonstration of the methods used in codling moth control.

They saw spray equipment at work, watched an instructive colour film describing the life history of the codling moth and were present in the Mullalyup Hall where a general discussion took place and numbers of pertinent questions were answered.

Apart from this, the field day provided ample evidence of the high degree of friendly co-operation existing between the fruitgrowers of this district and the officers of the Horticultural and Entomological Branches of the Department of Agriculture who were responsible for "scotching" the outbreak.

The Superintendent of Horticulture (Mr. H. R. Powell) paid a tribute to the whole-hearted support received from local orchardists when he said that, throughout the outbreak, he and his staff had been treated "not as policemen, but as friends." During the period of the control campaign there had been many examples of a willingness to "give and take" on both sides which had made for smooth and efficient working.

The Acting Director of Agriculture (Mr. A. L. McKenzie Clark) who attended the field day, paid a sincere tribute to the work of the departmental officers when he said that although he was not given to lavish distribution of verbal bouquets he wished to voice his appreciation of the fact that, to those concerned with the large-scale control work which had been initiated, the codling moth control campaign had been more than "just a job." It had been a task calling for keenness, initiative and hard work, all of which had been forthcoming in generous measure.

SOIL EROSION

The day commenced with a visit to the property of Mr. E. Della Sale, on which a quantity of valuable topsoil had been washed from the orchard by recent exceptionally heavy rains. The Commissioner of Soil Conservation (Mr. G. H. Burvill) described methods of preventing and controlling this form of soil erosion by working the orchards where possible "on the contour" and suggested that planting on the contour might be considered when laying out new orchards. Some interesting discussions took place concerning the value of maintaining a trashy mulch on the soil surface as opposed to clean cultivation.

On the property of Mr. J. Del'Agostino, demonstrations were given of the Kent sprayer, an English-made tractor-drawn unit which carried a 250 gallon vat of spray liquid for discharging through two hoses each carrying three nozzles on a "broomhead." Using a mixture of 3lb. arsenate of lead, one gallon of white oil and 2½lb. of 50 per cent water-dispersible D.D.T. powder to each 100 gallons of water, this machine moved through the orchard travelling at about one mile per hour and giving excellent coverage. Horticultural Instructors, Messrs. T. F. Herlihy and J. C. Rowbotham, demonstrated the machine and answered numerous questions concerning its operation and effectiveness. At a nearby stream it was shown that the sprayer could fill the vat in four and a half minutes by means of its built-in pump. It was stated that the maximum coverage accomplished in a day had been 23 acres of spraying using eight vats of liquid. In the control of codling moth in this area, 170 acres of orchard will be sprayed seven times, with the first three sprayings at 14-day intervals.

Mr. V. Cahill demonstrated a smaller spraying plant mounted on a utility truck and carrying two 120ft. hoses with spraying lances. This was widely used for the treatment of backyard trees in the Collie outbreak where the confined spaces were unsuitable for the use of the large outfits. The truck-mounted machine is now being used under similar conditions at Nannup.

COLOUR FILMS

Later in the day the Shell Co. of Australia showed some excellent films describing the life-histories of the codling moth and some species of aphides which attacked fruit trees. The films included a number of micro-photographs in colour which were both interesting and instructive, and the generous co-operation of this company—which had sent its mobile unit van down to Mullalyup especially to show these films—was greatly appreciated by all who attended. The Superintendent of Horticulture (Mr. H. R. Powell) had arranged for a number of questions to be asked in the hall and these were answered on the spot by various departmental officers.

QUESTION TIME

Replying to the question "Why are codling moth sprays given at 14-day intervals for the first three sprays with longer intervals for the later sprays?" the Government Entomologist (Mr. C. F. H. Jenkins) said that the first application was primarily a calyx spray as the newly hatched codling moth caterpillars preferred to enter the young fruit through the calyx at an early stage of setting. The aim was to ensure that the calyx was coated with poison at this stage and the extra short-term sprays were given to cope with the spread of hatching. Naturally, all the larvae did not emerge at the same time and there was also some variation in the closing of the calyx in fruit on the same tree. Later sprays kept the skin of the apples coated with poison and helped to destroy any larvae not dealt with by the early sprays.

Asked whether any tolerance of codling moth to D.D.T. had developed in Australia, Mr. Jenkins said that there had been no evidence of this as yet, although some tolerance to arsenate of lead sprays had been reported, and certain scale insects in the United States of America had apparently developed some degree of resistance to cyanide fumigation.

At the request of Mr. Powell, Mr. Herlihy outlined the work carried out in extensive surveys throughout a wide area. He said that orchards from Mullalyup to Donnybrook, Mullalyup to Bridgetown, Bridgetown to Nannup, Balingup to Nannup, also orchards on the Busselton and Manjimup roads had been carefully surveyed by officers of the Horticultural Branch. These surveys would be repeated during the month of February.

Asked what other control measures were used in addition to spraying, Mr. Rowbotham said that the trees were bandaged to provide suitable hiding places for the caterpillars and these bandages were examined weekly so that any lurking larvae could be destroyed. Loose bark, which could provide concealment for the caterpillars, and broken limbs, in the crevices of which grubs often concealed themselves, were removed. Infested fruit was picked and burnt, and in many cases it had been necessary to destroy fences, sheds and accumulations of rubbish which could harbour codling moth larvae.

Infested areas were quarantined and careful examinations were made of stored fruit in these areas and also of all equipment such as graders, vehicles, and stores of shooks and cases. Sometimes flooring and walls of sheds were removed in the search for hidden larvae, and even household boxes and containers were examined. In some cases infested material had to be destroyed by burning, but in other instances treatment with hot water or fumigation was sufficient.

INTRODUCTION PROBLEMS

Asked whether any restrictions were in force against people bringing apples and other pome fruits from the Eastern States or other countries, the Acting Superintendent of Horticulture (Mr. F. Melville) said that a total prohibition was in force. A considerable amount of publicity by the Press, radio, loudspeakers, posters and other means was employed to acquaint the travelling public with the need for keeping such fruit out of this State. Inspectors were appointed to attend at all ports and airfields, and all inward freights were examined.

The influx of Eastern States beekeepers to Western Australia in recent years made it necessary to insist that hives brought into this State were certified as not having been in or near Eastern States orchards. It must be appreciated, however, that the policing of a total prohibition imposed on the importation of apples, pears and quinces was particularly difficult as one could not insist upon seaching the personal luggage of every passenger. During the war years

Fig. 1.—The Kent sprayer, used in the codling moth campaign, showing the machine attached to the tractor from which it is operated by the power take-off

Fig. 2.—The sprayer in operation in an orchard. Note the powerful and finely-diffused distribution of the spray liquid through the "broomhea ds," each of which carries three nozzles

when Eastern States troops were stationed in Western Australia, there were many instances of fruit being sent in food parcels and codling moth larvae were discovered in a number of these packages. Even cases containing personal belongings were found with codling moth pupae in the corners of the case. It would be realised, however, that where larvae or pupae were brought into Perth, moths which hatched subsequently had some distance to travel before they could establish themselves on apple trees, whereas in a town like Collie, which possesses something like 30 acres of backyard trees, an infestation could start very easily.

BRYOBIA MITE

One orchardist asked whether there are any sprays capable of dealing with Bryobia Mite, the numbers of which were apt to build up where D.D.T. sprays had been used for the control of apple jassid and other insects.

The Government Entomologist said that although there was ample evidence of the effectiveness of D.D.T. against such pests as apple jassid and codling moth he did not recommend its use in cases where another spray would be equally effective. Natural enemies of bryobia mite or woolly aphis such as ladybirds and hover flies, were destroyed by D.D.T. and a subsequent build-up of mite and aphis was often noted when D.D.T. was used.

To control bryobia mite and woolly aphis he advised using a dormant spray —such as red oil or lime-sulphur—as a means of reducing hatching. Proprietary sprays containing organic phosphate put on in December or incorporated in sprays

used later, in February or March, gave good control if an extra build-up of the mite population occurred. These sprays were also toxic to ladybirds and similar insects, but were not as persistent as D.D.T.

THE BURNING QUESTION

Some orchardists were perturbed by the burning effect of the codling moth spray on foliage, particularly when applied during the hotter hours of the summer days and asked the Superintendent of Horticulture whether it would be possible to confine the spraying activities to the early morning and later afternoon periods during spells of hot weather. In reply, Mr. Powell said that he would endeavour to carry out their wishes in this respect wherever possible, but he wished to emphasise the fact that they had a very large spraying programme to complete and it may be necessary to continue the work irrespective of weather conditions.

It was appreciated by local fruitgrowers that "The Spray Must Go On" as one humorously paraphrased an old saying, and Mr. L. W. Gates, Chairman of the Balingup branch of the Fruit Growers' Association, who said that his own trees had suffered, expressed himself as being in complete though reluctant agreement.

Many orchardists from "clean" areas admitted that they had learnt much about codling moth, an insect which they would not have recognised previous to the field day.

Mr. Powell urged growers to send along for identification immediately any caterpillars found in apples, pears or quinces as early identification greatly facilitated the stamping out of an infestation.

In stressing the importance of this work, he explained that this was the 15th separate outbreak of codling moth infestation in this State over the last 48 years.

When one considered that the estimated annual cost—for material and labour alone—of giving seven sprayings yearly to the 11,000 acres of apples, pears and quinces in this State would be in the order of £220,000, it would be readily realised that it was well worth while to spare no effort in eradicating these outbreaks promptly. Western Australia is practically the only extensive apple-growing area in the world in which the codling moth has not become permanently established and the Department of Agriculture was determined to keep the pest out of our orchards.

A VISIT TO BRAMLEY

THE Bramley Research Station, situated astride the main Busselton-Augusta road between the townships of Cowaramup and Margaret River, is one of the latest additions to the State's growing list of experimental properties.

Formerly operated as a small dairy farm it was purchased by the State Government in 1950 with a view to its use as an experimental farm for research into local livestock and pasture problems. The property is 253 acres in extent and is situated on jarrah and redgum country which is typical of the soils of that district.

LIVESTOCK RESEARCH

One section of the farm has been set apart for fundamental research work into the copper requirements of farm animals. In their natural state, prior to the introduction of special fertilisers, the soils of this region were unprecedentedly low in copper. Deficiency

diseases such as "coast disease" and "falling disease" once took serious toll of stock in these areas and, although the ailments have been brought under control by the widespread use of copperised superphosphate and the use of special licks, much more research work is needed. Some of it is being undertaken at Bramley by the Animal Health and Production Division of the C.S.I.R.O. working in conjunction with our own Animal Health and Nutrition Laboratories. This will be a long-term project.

On the short-term side, the station's herd of grade dairy cattle will be used for controlled experiments designed to test the efficiency of phosphatic supplements in improving growth rates and sexual maturity in heifers, and in enhancing production and improving conception rates in cows.

FARMERS' UNION VISIT

On December 19, members of the Cowaramup branch of the Farmers' Union of Western Australia included a visit to the Bramley Research Station in the programme for the district's annual field day. The president of the branch (Mr. Eric Bignell) in an introductory address said that the farm was an ordinary "F.A.Q. sample" of many farms in the district, and local farmers were anxious to see the various developmental projects from their inception.

The Animal Nutrition Officer (Dr. L. C. Snook) said that the Bramley herd, now being used for the phosphatic supplement experiments, was developed from a draft of in-calf grade heifers purchased from the Wokalup Research Station. After the animals had calved and it was possible to check on their production figures—which varied widely—the herd was divided into two sections of 13 animals as evenly as possible. An endeavour was made to include good and bad producers in each section and the toss of a coin decided which section should receive the phosphatic supplement.

"SUPER-JUICE"

This was given in the form of a concentrated solution of superphosphate made by dissolving 5 lb. of superphos-

Some interested visitors at the Bramley Research Station Field Day.

phate in a gallon of water and drawing off the clear liquid. Popularly known as "super-juice", a pint of this solution contained as much phosphorus as 7 oz. of bonemeal, said Dr. Snook, and the liquid was administered by mixing it with the very small quantities of crushed wheat and pollard fed in the bails.

All the cows were run together, milked together and, apart from the fact that one section received "super-juice", they all had absolutely identical treatment in all respects.

The tests were commenced on August 1, 1951, and although it was hardly to be expected that any significant differences would be observed as yet, especially as the animals were running on good, heavily top-dressed pasture, those receiving the superphosphate supplement seemed to "have the edge" on the non-phosphate group. Although at this early stage he hesitated to give the credit to the phosphatic supplements, Dr. Snook said that it was interesting to note that the six best cows in the group receiving "super-juice" were producing significantly better (3-4 lb. more milk per day) than the six best cows in the non-phosphate group. Nine of the cows receiving phosphates would be calving early in the season and all were in calf. In the non-phosphate group six cows would be calving late in the season and one was not in calf.

Apart from the 26 animals in the two groups, two cows were being used for experiments in the feeding of rock phosphate. One of these, a high-producing Friesian, had been receiving 3 oz. of rock phosphate daily for two years and was in excellent health. She calved successfully and produced up to five gallons of milk daily after calving. The feeding of rock phosphate, however, is not recommended as yet as it is desirable that more information on this subject should be obtained.

PASTURE EXPERIMENTS

It is intended to inaugurate a number of experiments in pasture establishment and maintenance, and with this object in view, plots of lucerne and sudan grass were planted at Bramley last October. Commenting on these plots the Assistant Superintendent of Dairying (Mr. H. G. Elliott) said that local experience had often shown that lucerne would not persist, and his branch was carrying out a programme of research work in an endeavour to overcome this drawback. New strains which were better than the Hunter River strain for grazing were now being grown. One of these was Lucia, a selection from Hunter River, while another variety which showed promise was a creeping type of lucerne which came from New Zealand. Mr. Elliott said that well-drained country was needed for the successful growth of lucerne. The plant could not stand "wet feet" and the water table should be at a depth of not less than five or six feet if any degree of persistence was to be looked for.

Lucerne was popularly reputed to thrive on well-limed soils, and a number of experimental plots at the Denmark Research Station and elsewhere had been planted to give information on this subject. Lime-sand, ground limestone and hydrated lime were being used in the different experiments. Referring to sudan grass, Mr. Elliott said that here again endeavours were being made to find more suitable strains. Many failures in sudan grass establishment which had occurred in the dairying areas were due to the inability of the farmers to sow the seed correctly. "The time has come when you must cease to be merely graziers," said Mr. Elliott. "From now on you will have to become farmers and use machinery, such as drills, to sow sudan grass, oats and other pasture crops." Mr. Elliott pointed out that by using drills it was

possible to sow the seed on the moist soil layer up to two and a half inches below the ground surface. After rain it may be necessary to break the dry surface in order to allow young plants to get through the hard crust. In growing pasture crops he recommended the use of straight superphosphate on old clover land with varying quantities of sulphate of ammonia on the less fertile soils.

Crops such as maize made heavy demands on the farmers' time and labour, whereas sudan grass and oats could be grazed. His branch was carrying out a considerable amount of research work involving trials of Japanese millet, saccaline, maize for silage, sorghums to produce grain for pigs and fowls, special varieties of oats which could be grazed and then left to recover and yield a grain crop, and new strains of pasture grasses such as bromes and phalaris.

A FREAKISH SUMMER

STOCK and crop reports issued by the Commonwealth Weather Bureau show that in 1951 Western Australia experienced one of the most freakish December rainfalls on record. Heavy rain throughout the State delayed harvesting in many instances and considerable damage was done to bagged wheat and baled hay. Severe hailstorms damaged a number of crops but by far the greater part of the serious damage was caused by heavy rain and wind.

Mean rainfall in the various subdivisions is shown below:—

District.	Mean Rainfall. Points.	Departure from Normal.
North Coastal ..	84	140% above
Central Coastal	292	421% above
South Coastal ..	198	144% above
North Central ..	99	106% above
South Central ..	206	268% above
Salmon Gums-Esperance	184	136% above

In the North Coastal sub-division harvesting was delayed by bad weather during the first half of December but dry conditions towards the end of the month permitted satisfactory completion on many properties. Hail destroyed much valuable pasture growth and some wheat crops were slightly affected by rust.

In the Central Coastal sub-division rain damaged many pastures and substantial quantities of dry feed was spoiled. Oats yielded well and vines and citrus fruits showed promise.

In the South Coastal sub-division much hay was spoiled by rain. Potato planting was delayed and there were some losses of early potato crops. A number of sheep died after the rains probably due to the ingestion of damaged fodder.

Harvesting finished in reasonable good time over most of the North Coastal sub-division but yields were patchy.

In the South Coastal sub-division harvesting was delayed and considerable damage was done to crops and hay by wind and rains. Yields in the early part of the month were about average but fallow lay towards the end of the month owing to bad weather conditions having damaged the crops. In the Ravensthorpe area where the year's rainfall was the highest since 1923 there was a fairly serious outbreak of rust in wheat crops.

In the Salmon Gums-Esperance subdivision rust also took toll of a number of crops and caused a reduction in yields. Many farmers said that this was the worst December ever experienced for harvesting.

APPLES, PEARS & STONE FRUITS

Season's Prospects Reviewed

By H. R. POWELL, B.Sc. (Agric.)

(Superintendent of Horticulture)

DISAPPOINTING settings of pome fruits have been a feature of this season's crop reports. Hail caused heavy losses in restricted areas and a lot of fruit was blemished by looper caterpillars. The setting of stone fruits was particularly good.

APPLES

Flowering.—In contrast to the experience of recent years, delayed foliation was not a factor to be contended with this season and consequently most varieties flowered in their proper sequence. The flowering itself was even and mostly heavy, with the main exception of Jonathans. This variety flowered unevenly and gave little promise of setting a heavy crop.

Weather conditions during the latter part of October were mostly unseasonable, being cold, showery, and in the Southern and South-Western districts rain fell. These conditions followed a very dry and warm spring—conditions suitable for the rapid development of thrips. A careful watch was maintained and it was only in the Great Southern districts that they appeared in plague form. They were present in other districts in greater numbers than usual, particularly in the Hills districts. It was possible for some growers to take control measures and a number sprayed their orchards with D.D.T.

Setting.—Generally the setting has been disappointing. There was every indication that the crop would be uniformly heavy in the South-Western districts following last season's medium crop. The setting of some of the main varieties in these districts although not heavy, is reasonably good; the varieties concerned being Granny Smith, Cleopatras, Yates and Rokewoods, and to a lesser extent Jonathans. Most of the late varieties, including Statesman, Nickajacks and Rome Beauties, are much lighter than usual; Dunns have also set a very light crop. A feature of the crop in these districts is the evenness of the setting and excellent growth of the fruit. There is no doubt that severe winter temperatures prevented delayed foliation.

Very poor crops have set in the Great Southern districts, including Mt. Barker, Kendenup, Albany and Denmark. Thrips were present here in plague proportions and did considerable damage to the blossoms. It is significant that most growers who sprayed early, obtained good settings. On those orchards that were not sprayed, the trees are very light; it is most unusual to see numerous trees of such consistent bearers as Yates and Cleopatras completely devoid of fruit. These districts usually average 350,000 bushels of fruit annually, and as it is expected this season that the total pack out of fancy and better grades (export standards) will not exceed 50,000 bushels, it is apparent that a very severe blow has been dealt to the fruit production of the State.

A lighter than average setting was also experienced in the Hills districts. Thrips were present in the blossoms in large numbers, but at no stage did they approach plague proportions. It is apparent, however, that some damage was done and it is significant that where

sprayings with D.D.T. were carried out the setting was much heavier.

Growing Conditions.—Growing conditions have been particularly good and trees in most orchards are making excellent growth. Average fruit size is much greater than has been the case for quite a number of years. There is an increase in the amount of leaf variegation or "chlorosis," but this condition does not cause much damage unless the season turns out very hot, when the chlorotic leaves tend to burn very readily.

Blemish due to insect bites is more common than usual. Extensive damage has been caused by looper caterpillar and to a lesser extent by climbing cutworm and spring beetle.

There are still a number of growers who delay control measures until they are satisfied that the expense is warranted; by that time the damage is often widespread. It is significant that where 0.1 per cent. D.D.T. was used against thrips, and arsenate of lead was applied immediately after petal fall, damage was negligible. On unsprayed orchards 60-100 per cent. of the fruit on the trees is marked; this is very apparent in the Great Southern districts.

"Dimpling" of Granny Smiths is common on light crop trees, but does not appear to be as widespread on trees which were sprayed with D.D.T. for thrips control. This matter will be investigated next season.

Generally, orchards are in good condition and the trees are making excellent growth. Such pests as the apple leafhopper and bryobia mite are not as yet causing concern.

Hail caused some damage in widely separated areas. A severe storm in early December ruined an area in the Donnybrook district; but, though unfortunately disastrous for the growers concerned, the damage was not spread over a large portion of this district. It is estimated that approximately 10,000 cases have been ruined.

Estimate of Crop Production.—It is estimated that the apple crop this year will approximate 1,037,000 bushels good and better grades.

PEARS

Following last season's heavy crop the setting has been disappointing, particularly in the Great Southern districts.

The most consistently good varieties are Bartletts and Keiffers and it is expected that these crops will approximate to 75 per cent. of last year's production. Export varieties such as Comice, Packhams Triumph, Josephine and Beurre Bosc, have set light to medium crops and Winter Nelis much lighter.

The incidence of "Black Spot" has been severe, due no doubt to the moist spring and early summer weather conditions. Even on many sprayed orchards damage is considerable, not only on the foliage, but on the fruit as well.

Estimate of Crop Production.—It is estimated that the pear crop will approximate to 79,500 bushels good and better grades, of which Bartletts will amount to 27,000 and Keiffers to 8,000 bushels.

STONE FRUITS

Stone fruits have set heavily in all districts, with the possible exception of Goldmine nectarines. Mid-season and late varieties of apricots have not carried heavy crops for a number of years, but this season the setting has been good. One of the difficulties of a heavy stone fruit crop is the necessity for heavy thinnings; without this the fruit does not develop properly and consequently brings poor prices when marketed. The failure to thin adequately is due in some instances to lack of labour, but in others it is due to the attitude of the growers concerned. It is very noticeable that the higher market returns come to those who regulate the cropping of their trees by intelligent pruning and heavy thinning.

Orchard Notes for March and April

By OFFICERS OF THE HORTICULTURAL BRANCH

COVER crops should be planted with the first winter rains to ensure satisfactory growth before the cold wet weather sets in.

New Zealand Blue Lupins are the favourite crop, particularly amongst citrus orchardists. The lupin is a vigorous plant and produces excellent bulk. Tick beans may be used as an alternative crop and are useful in shaded positions. They are extensively used in commercial vineyards. Field peas may also be planted but the bulk of green material produced is much less than from lupins or tick beans.

These three leguminous crops should be sown at the rate of 1½ bushels per acre. They should be planted with the minimum amount of cultivation necessary to prepare a seed bed. Superphosphate at the rate of 1 cwt. per acre should be included with up to 1½ cwt. of potash if desired. Where no cover crop is to be planted a dressing of superphosphate will assist the growth of the volunteer weed crop.

Where legumes are being planted for the first time it is advisable to innoculate the seed with an appropriate bacterial culture which is available from the Department of Agriculture.

DISEASE AND PEST CONTROL

(a) **Brown Rot of Citrus.**—Apply a seasonal spray of Bordeaux mixture at 4:4:40 strength about the third week in April, covering the lower two thirds of the tree. Low hanging branches which drag on the ground should be shortened and the foliage generally thinned to allow light and air into the tree.

(b) **White Wax Scale.**—If a further spray is necessary to control this pest it should be applied as early in March as possible to destroy the insect before the thick protective wax covering is formed.

The following spray should be used:—

2½ gallons white spraying oil.
20 lb. washing soda.
100 gallons water.

(c) **Fruit Fly.**—In all districts where fruit fly is known to exist, owners of fruit trees are required to adopt control measures for fruit fly according to the Plant Diseases Act Regulations.

These provisions include:—

(1) The application of foliage baits at six day intervals to all trees carrying fruit, commencing six weeks prior to maturity and for two weeks after all friut has been harvested. The bait to be used consists of:—

1 oz. sodium fluosilicate.
2½ lb. white sugar.
4 gallons water.
Fruit juices may be included if available.
Proprietary mixtures are available such as Lurotox and Beech's 109.
Should rain wash the bait off the trees a further application is necessary.

(2) The gathering of all fallen fruit and destroying by boiling or other methods approved by the Department. In the case of soft fruits, fallen fruit should be picked up at least once every 24 hours, and in the case of other fruits at least once every three days.

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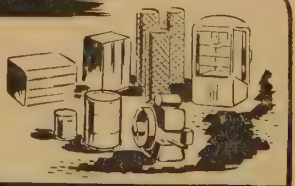

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NUTRITIONAL SPRAYS

These include sprays containing zinc, copper, or manganese, and for citrus trees may be applied during the autumn flush of growth in April as an alternative to spring applications to remedy various deficiency symptoms that appear.

(a) **Zinc Deficiency.**—Mottle leaf and little leaf are typical symptoms of zinc deficiency. Sprays which may be applied to overcome this condition are:—

(i) Zinc Oxide: 3 lb.
White Spraying Oil: ½ gallon.
Water: 100 gallons.

(ii) Zinc Sulphate: 4 lb.
Lime: 4 lb.
Water: 40 gallons.

(b) **Copper Deficiency.**—Copper deficiency or Exanthema may be treated by the application of copper sulphate or bluestone to the soil at the rate of 1 to 4 lb. per tree, or by the application of a Bordeaux spray.

(c) **Manganese Deficiency.**—Where symptoms of manganese deficiency are present on citrus trees, the following spray may be applied:—

Manganese Sulphate: 4 lb.
Washing Soda: 4 lb.
Water: 40 gallons.

PICKING MATURITY OF GRANNY SMITHS

Granny Smiths are susceptible to superficial scald during cold storage. In an attempt to overcome this physiological trouble medium sized fruit should be chosen and picked during the last week in April. Reject fruit showing any sign of sunburn as this fruit has a tendency to scald easily.

Oil wraps are essential for all Granny Smith apples intended for storage or export as these wraps assist in the prevention of "scald."

—— WARNING ——
to
Superphosphate Users

There is an acute shortage of cornsacks this season. Farmers should protect their interests by sending in any good bags for their Superphosphate. These should be clearly labelled with sender's name and address, marked "Returned empties," and consigned to the Works from which the Superphosphate has been ordered.

If taking their orders in two or more parts, tip out the first part under cover and send the bags back for refilling.

60/9 per dozen will be allowed by Superphosphate —— Manufacturers for all bags for refilling ——

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DIPHENYL WRAPS FOR ORANGES

Storage Experiments with Washington Navels

By F. MELVILLE, B.Sc. (Agric.)
Acting Assistant Superintendent of Horticulture

DIPHENYL impregnated wraps have been successfully used on a commercial basis overseas for improving the keeping quality of oranges. Last year, Mr. E. G. Hall, of the C.S.I.R.O. Laboratories, Homebush, kindly made available a quantity of diphenyl wraps of American origin and some of these were used in a small storage experiment with Washington Navel oranges.

The oranges were obtained from Messrs. E. and K. C. O'Neil, of Chittering, on July 12, 1951, and after careful sorting for comparable quality and size the fruit was divided into the following treatments:—

1. Diphenyl wraps .... 5 cases.
2. Sulphite wraps — control 5 cases.
3. Pliofilm wraps .... 1 case.
4. Wax dip—Sulphite wraps 2 cases.

The same counts were used in both the diphenyl wrapped and sulphite wrapped cases and a careful selection was carried out to eliminate as far as possible the quality factor. The pliofilm wraps and the wax dip which consisted of:—

Brytene .... 1 part.
Solution of 4% Borax plus 2%
Boric acid .... 4 parts.

were additional to the main experiment and were included merely to provide further comparisons. The wax dip was maintained at a temperature in the vicinity of 110° F. The fruit was immersed for approximately three-quarters of a minute and allowed to dry before wrapping in sulphite paper. All fruit was kept in common store at normal room temperature.

An initial inspection of one case from each treatment was made on August 16, five weeks after packing, while the final inspection was carried out on September 3, after seven weeks' storage. The results are tabulated in Table I.

KEEPING QUALITY IMPROVED

A definite improvement in the keeping quality of the fruit in favour of the diphenyl wraps is evident from the figures quoted. Mould infection varied from 6.4 per cent. to 14.3 per cent. in cases of sulphite wrapped fruit after seven weeks' storage, while in cases of diphenyl wraps mould infection ranged from nil to 5.8 per cent. The average for the former treatment was 11.5 per cent. and for the later 2.1 per cent.

A marked difference also occurred in the appearance of the two groups. In the

TABLE I.—Showing percentage of rots under various wrapping treatments.

Treatment.	Date of Inspection.	Period of Storage.	Count.	Percentage Rots.
		weeks.		
Diphenyl Wraps	16–8–51	5	96	0·0
	3–9–51	7	154	5·8
	3–9–51	7	140	2·0
	3–9–51	7	126	0·6
	3–9–51	7	96	0·0
Average	....	....	....	2·1
Sulphite Wraps—control	16–8–51	5	140	6·4
	3–9–51	7	154	14·3
	3–9–51	7	126	12·8
	3–9–51	7	112	10·7
	3–9–51	7	96	13·5
Average	....	....	....	11·5
Wax dip—Sulphite Wraps	3–9–51	7	112	4·5
	3–9–51	7	112	0·9
Average	....	....	....	2·7
Pliofilm Wraps	3–9–51	7	112	9·0

diphenyl group two nests of rotted fruit were found in the 154 count, but generally the mould was restricted to single fruits and in two cases no rots were found at all. The general appearance of the cases on opening was good and rotted fruits had in no way affected surrounding fruits. In the cases of sulphite wrapped fruit on the other hand, the mould had spread considerably, nesting was prevalent while wraps even on the sound fruit were damp, discoloured and of very poor appearance. The general presentation of these packs was most unattractive.

Oranges in both groups were showing signs of wilting at the time of inspection, buttons were dry and in some instances fungal growths were present on the short stalks and buttons. Rind blemishes had developed on a small proportion of the fruit due possibly to brown rot infections which had dried. These blemishes were very slight in the diphenyl wrapped fruit, but were much more prevalent in the sulphite group.

The diphenyl had imparted a taint to the oranges. This varied from fruit to fruit but, although noticeable, was not necessarily disagreeable. The taint was not appreciably reduced by leaving the fruit unwrapped for several days after the final inspection. At the conclusion of the experiment the sound fruit was sold by auction on the local market, and realised prices equivalent to the ruling prices for Washington Navels on that day. No complaints were received from buyers regarding tainting.

The diphenyl content of the wraps was determined for the new wraps. Wraps were also removed from the fruit after seven weeks' storage and a further determination made. The results are shown in Table II.

It will be seen that over 40 per cent. of the diphenyl had been dissipated during storage.

WAX DIP GIVES GOOD RESULTS

The waxed fruit had maintained very good condition and appearance after the

TABLE II.—Showing the Diphenyl content of Wraps before and after use.

	Sample.	Date.	Diphenyl Content.
			per cent.
1	Before use	18–7–51	9·5
2	After use	4–9–51	5·6

seven-week storage period. The fruit was less wilted than in the diphenyl or sulphite wrap treatment, some buttons were still quite green and although five rots were found in one case this was confined to a nest of four and an odd rot. The other case contained only one rotted orange. It appeared that this treatment was equally as good as the diphenyl wraps as far as keeping quality was concerned and for long storage was superior due to reduced wilting.

Pliofilm wraps maintained the sound fruit in an excellent condition. At the end of seven weeks the buttons were still green and the fruit still retained much of its original freshness. However, condensation on the inside of the wraps was responsible for nine per cent. rots at the end of the storage period. Pliofilm wraps are very expensive, costing in the vicinity of three to four shillings per case and it appeared that they would need to be used in conjunction with waxing to be satisfactory. The use of pliofilm does not, therefore, appear practicable.

CONCLUSIONS

In this State where all citrus growers handle their own fruit and no large sheds are in existence the cost of installing a wax dipping plant would not be warranted. However, it might be possible for growers to process their export fruit by hand as large quantities are not usually involved. Provided shipping is running to schedule and the fruit is not held prior to shipment, the short voyage to Singapore is insufficient to seriously affect the condition of the fruit. However, rots cause considerable losses at times and a fungical wrap would be of considerable benefit in minimising these losses. Furthermore wraps can be readily utilised by growers under the existing conditions.

Judging by the results of the experiment, diphenyl wrapped oranges could be expected to open up in very good condition in Singapore. Apart from the reduction in losses of fruit, the general presentation is considerably enhanced. Considering the short period between packing and sale on the overseas market it is anticipated that the diphenyl taint would not be serious.

Diphenyl wraps, therefore, appear to have possibilities as far as export is concerned, while the possibility of using wax dips cannot be overlooked. Both methods require further investigation.

Recent Advances in Veterinary Medicine

New Discoveries Open Up Wide Field in Curative Treatment

By J. SHILKIN, B.V.Sc., Senior Veterinary Surgeon

DURING and since the years of World War II many notable advances have been made in the treatment of human ills and in many cases a secondary development of these discoveries has been the use of new substances in the treatment of disease in domestic animals.

As a result of the tremendous impetus given to research work during this period our chemists evolved substances which acted specifically on the micro-organisms responsible for certain diseases. They produced new insecticides which greatly reduced the incidence of infection by disease-carrying insects and other preparations which have proved strikingly effective against various forms of internal parasites.

Many of the products developed in recent years are already well-known to farmers who have become familiar with such substances as phenothiazine, sodium fluoride, D.D.T., gammexane, the sulpha drugs and penicillin.

Others such as aureomycin, chloromycetin, streptomycin, are possibly known by name to some in relation to human treatment, but up to the present have not been available within Australia for general veterinary use. Still others such as propamidine, tetmosol, terramycin, and the antihistamine drugs are probably unknown to most laymen.

It is proposed, in this article, to make reference to the most important of these new preparations and to give some indication of their present and in some cases, future uses.

ANTISEPTICS AND DISINFECTANTS

Propamidine

During the war years a series of drugs was developed to deal with certain infections caused by protozoa, but owing to their toxicity their usefulness was limited. However, one of them, propamidine, was found to be useful as an antiseptic for open wounds, burns, etc., and for the treatment of infections of the womb such as metritis.

In combination with one of the sulpha drugs, sulphathiazole, it has been found useful in the treatment of that type of chronic mastitis in cows which does not respond to penicillin, namely, staphyloccal mastitis. It is now supplied for veterinary use in small collapsible tubes similar to those in use for penicillin, and is injected in a similar manner.

Reports of its use in England have been encouraging and although it is being used in this State it is too early yet to assess its value in the control of mastitis.

Quarternary Ammonium Compounds

These compounds have been used in the textile and woollen industries for many years as detergents or cleaners, but in 1942 antiseptic properties were discovered in some of them.

This discovery resulted in their use for the sterilisation of skin, treatment of burns, etc., and for these purposes they are quite valuable. As they possess detergent properties, they remove grease, dirt and tissue debris together with the bacteria contained therein, and in addition they form a protective layer on the skin which remains sterile for some time. They have no toxic effects when applied to cuts and abrasions.

The most important of these compounds used for veterinary purposes up to the present is cetylmethyl ammonium bromide or cetrimide.

DE-WORMING DRUGS

Phenothiazine

In this field the most outstanding advance has been the development of phenothiazine. This substance is now widely used for the treatment of many of the internal parasitic infestations of horses, sheep and cattle.

Sodium Fluoride

As the efficiency of phenothiazine for the removal of roundworms in pigs is rather low the discovery in the U.S.A. in 1945 that sodium fluoride administered in the food had a high degree of efficiency as an anthelmintic for this purpose was of considerable importance. Tests were carried out in Queensland by Roberts in 1947 which confirmed the American work, and since that time the feeding of sodium fluoride for the removal of roundworms in pigs has become more or less standard practice.

INSECTICIDES AND ACARICIDES

D.D.T.

There should be no need to mention the uses of D.D.T. in this country, but it might be well to point out that its use on a large scale is attended with certain dangers to domestic animals. Cats particularly are susceptible to D.D.T. poisoning, and it is preferable under most circumstances to keep it away from these animals.

In oily solution D.D.T. can be absorbed through the skin so that there would also be a danger if such preparations were used on animals. It has been found, too, that D.D.T. can be excreted in the milk and can by this means be poisonous to suckling young.

Gammexane

This substance which came into use later than D.D.T. is in some respects superior to it. It is less toxic to animals and in most cases has a longer residual effect on the skin surface. In

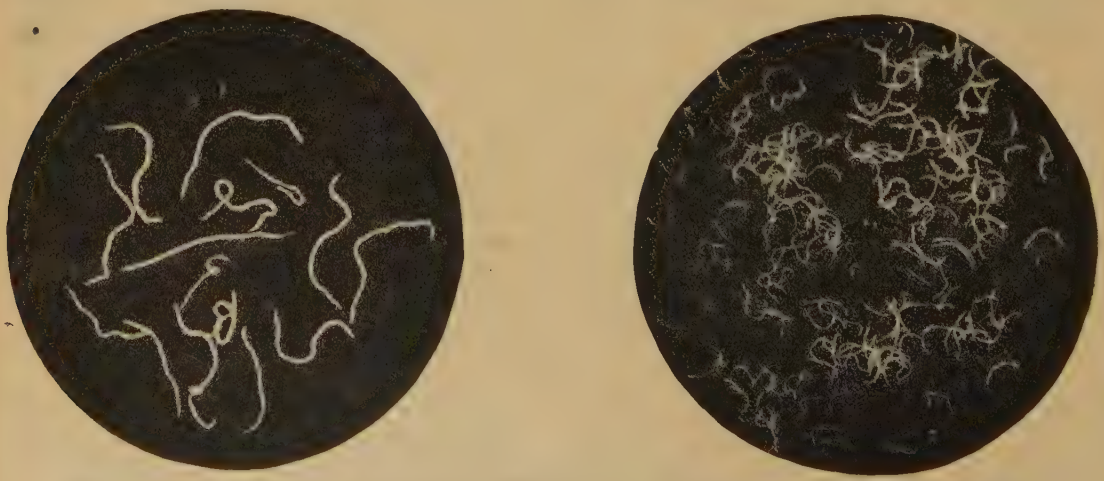


Fig. 1.—Large stomach worms (Barber's Pole Worms) on left, and hairworms on right (natural size). These parasites of sheep are easily controlled by phenothiazine suspensions.

addition, dips containing gammexane for the treatment of lice and ticks in sheep do not tend to "strip out" as quickly as the D.D.T. preparations. Against some of the mange parasites in animals, gammexane has been found much more efficient than D.D.T.

It may be of interest to note that experiments carried out on the feeding of gammexane by mouth have indicated that animals so treated become toxic to some insects. In this way rabbits have become toxic to bed bugs and other blood-sucking insects, cattle to ticks and certain flies.

Tetmosol

This was the only new drug introduced during the war years especially for the treatment of mange conditions in man (scabies) and animals.

It is relatively non-toxic, superior in action to most previous preparations and is clean and simple to use, which makes it valuable in the treatment of skin condition of small animals.

Fig. 2.—This is a portion of the small intestine of a pig, tightly packed with large roundworms (Ascaris lumbricoides). Treatment with sodium fluoride would have removed most, if not all, of the parasites.

In addition to its effectiveness in mange it has been found of value in fungus infections (ringworm) of animals. It is used both in solution and incorporated in a specially prepared soap.

HORMONES

Considerable advances have been made in this field in recent years but further information regarding the uses of known hormones and the development of others at present unknown is likely in the future.

This is such a large subject that it can only be touched on in an article of this nature.

Stilboestrol

Mention might be made, however, of such hormones as stilboestrol, a synthetic hormone, which is being used to some extent in cattle practice in the treatment of retained afterbirth, metritis (inflammation of the womb) and also for the chemical caponising of cockerels.

Whilst most hormone preparations are quite expensive there are many conditions in which they can be used to advantage. As the dosage in most cases must be carefully controlled they are unlikely to be made freely available to the public except in special circumstances, for example, chemical caponising.

Cortisone (Compound E) and A.C.T.H.

The discovery of cortisone may prove to be one of the most important of recent times. It was actually discovered in 1936 but only recently found to be

successful in the treatment of arthritis in man.

It is a very complex substance produced naturally in the suprarenal glands but can be produced synthetically. Up to the present, however, the cost of production is very great and considerable efforts are being made to obtain it by alternative and cheaper methods.

A.C.T.H. is a hormone produced naturally in the anterior pituitary gland and by its action on the adrenal glands produces the same effects as cortisone.

Both of these substances have so far been restricted to human medicine for the purposes of treatment, but in America trials have been carried out with animals.

They may prove to be of value in the treatment of arthritic conditions and in asthma but there are suggestions of possible dangers in their use. There are already indications that the administration of cortisone and A.C.T.H. may lead to greater susceptibility to infection. Should there be interference with the general defences of the body then there is certainly danger in the administration of these substances and the use of them in the treatment of animals will necessarily require considerable care.

ANTIBACTERIALS

Sulphonamides

This group of drugs is now well known. They were the first chemotherapeutic substances produced for the specific treatment of various bacterial infections, and whilst large numbers of sulphonamides have been produced only a comparatively small number are in general use for medical and veterinary purposes. Some of the earlier preparations like sulphanilamide and sulphapyridine have largely been replaced by newer and less harmful sulphonamides.

The most widely used sulpha compound for the treatment of animals in Australia would probably be the soluble form of sulphamezathine, sodium sulphamezathine, which is of value in such conditions as pneumonia, and septicaemia in cattle, sheep and pigs; footrot in cattle; scours in calves, and pullorum disease and coccidiosis in poultry.

ANTIBIOTICS

This term is generally used to refer to antibacterial substances produced by microbes (bacteria, moulds, etc.).

Antibiotics are quite new in the medical and veterinary fields but even so are now widely used. The production and use of these substances have largely revolutionised the treatment of many diseases and further advances will undoubtedly result in the mastering of conditions in which treatment has hitherto been unsuccessful.

Fig. 3.—Drenching a young pig with oil of chenopodium by means of a drenching gun. Sodium fluoride given in the feed in powder form is much more easy to administer and even more effective.

Penicillin

This was the first of the antibiotics found to be suitable for medical and veterinary purposes. Whilst originally discovered in 1929 its value was not recognised until early in the war years and it did not become available for use until about 1945.

Large scale production in America and the constant attempts to improve production methods were most successful and this work undoubtedly stimulated the search for new and improved antibiotics. As there has always been a fear that organisms would develop a resistance to penicillin there was added necessity to find newer substances.

The use of penicillin in the treatment of streptococcal mastitis is well known. In addition, it is widely used for the treatment of many conditions resulting from bacterial infections.

Streptomycin

The first great discovery after penicillin in this field was streptomycin. It is produced from organisms similar in variety to those causing actinomycosis (Lumpy Jaw) in cattle, and its discovery has resulted in considerable activity in the examination of similar organisms in the hope of finding new and improved therapeutic agents.

It is the first substance found which is active against the organism causing tuberculosis in man. As streptomycin may produce undesirable side-effects, its use has been somewhat restricted on this account. However, by various means, such as the concurrent use of other drugs, it has so far survived the encroachment of other preparations for this purpose.

In the veterinary field, considerable attention has been focussed on it in the treatment of mastitis due to staphylococcal and other organisms, and it has been found to be fairly successful for this purpose. Preparations similar in form to those containing penicillin are now available in Australia for the treatment of mastitis. They are rather more costly than penicillin but not excessively so.

There are a number of other diseases in animals in which the use of streptomycin offers possibilities, particularly, Johnes disease, actinomycosis and vibrionic abortion of cattle.

Aureomycin

This antibiotic was only discovered in 1947-48. It appears to have possibly the widest range of antibacterial activity of any so far produced with perhaps the exception of terramycin.

Unlike penicillin, which produces antienzymes which have the effect of destroying the penicillin, aureomycin is unlikely, on present indications, to result in the production of resistant organisms.

Aureomycin is now widely used in human medicine in Australia but so far has only been available to any extent for the treatment of animals in the U.S.A.

American reports indicate that it will have a wide variety of uses. It is possible that it may be of value in most forms of mastitis, pneumonia and septicaemic diseases of cattle, calf scours, strangles in horses, skin infections, eye and ear infections, leptospirosis and cat influenza.

There are indications, too, that some virus conditions may respond to treatment with it.

Chloromycetin

This substance is interesting apart from other considerations, in that it is the first of the antibiotics which has been produced synthetically. Like aureomycin it is absorbed rapidly from the gastro-intestinal tract and consequently the usual method of administration is by mouth.

It covers a wide range of bacteria and certain large viruses, but little information is so far available regarding its use in the veterinary field. There are, however, indications that it will have considerable value against cat influenza.

Terramycin

This is the newest antibiotic to come into general use in the U.S. It is reported to have a wide range of activity with low toxicity and to be valuable in the treatment of small animals for such diseases as canine distemper, pneumonia, cat influenza, tonsilitis, ear infections, etc.

ANTIBIOTICS AND THEIR RESIDUES IN ANIMAL NUTRITION

Recent developments in this field are most interesting and offer considerable possibilities in the feeding of animals with the object of influencing growth rate. Residues in the manufacture of penicillin were found to be rich in carbohydrates and protein, but unfortunately, were bulky and difficult to handle. For this reason they are only likely to be utilised in close proximity to manufacturing plants.

Scientists in Britain and America discovered that streptomycin residue was rich in vitamin B12, which is a vitamin naturally produced in the rumen of cattle. Other animals, particularly pigs and poultry, have to obtain their requirements from animal protein food such as meatmeal, fishmeal, etc. Symptoms of deficiency in pigs and poultry are produced on wholly vegetable protein diets, but vegetable protein plus streptomycin residue will bring about normal growth in these animals. Even more recently, residues of aureomycin, chloromycetin and terramycin have been shown to be rich in vitamin B12, vitamin B12b, and in other undetermined substances. Supplementary feeding of these residues has resulted in increased growth rates in pigs and poultry of 10 to 20 per cent.

ANTIHISTAMINES

In recent years considerable attention has been directed to a group of drugs which have been produced in an attempt to overcome allergic conditions. It has been established that in allergies generally and in shock and burns a substance known as histamine is liberated in the blood stream. The object of the antihistamines is to counter the effects of histamine and in the past few years quite a number have been produced.

They are being widely used in human medicine and their use is steadily increasing in the veterinary field. It has not always been possible to determine whether certain conditions are in fact due to an allergy and much treatment has been carried out on a "hit or miss" basis. Fortunately some have responded and it would seem to indicate that allergy is, at least in some, bound up with them.

Such conditions as laminitis in horses, septic metritis and toxaemia associated with acute mastitis in cows, asthma and pruritis (itching) in dogs and quite recently pullet disease (avian monocytosis) in poultry, have all shown promise with this method of treatment.

POISON Plants OF WESTERN AUSTRALIA

By C. A. GARDNER,
(Government Botanist) and H. W. BENNETTS, D.V.Sc. *(Principal, Animal Health and Nutrition Laboratories)*

I. PITURI (Duboisia Hopwoodii [F. Muell.] F. Muell.)

ONLY a few of the drug-yielding plants found on their hunting grounds appear to have been known to the Australian aborigines. Among those used and valued was the plant called "pituri" by the Central Australian tribes. The leaves of this plant, after drying and suitable preparation, were chewed as a narcotic.

Pituri first came to the notice of the white man through the observations of Burke and Wills at Cooper's Creek in 1861, who received it from the natives there, and it is on record that the gift caused a severe headache to the recipients. The aborigines of Central Australia also chewed the leaves of the indigenous species of tobacco, principally *Nicotiana excelsior,* and the fact that the two species were often employed as a mixture lead to some confusion in determining the chemical properties of the so-called pituri, which was perhaps such a mixture in the first samples examined. In certain areas, such as the vicinity of the Blythe and Everard ranges, although pituri occurs there abundantly, the natives (according to Helms, who was botanist with the Elder Exploring Expidition), chewed the leaves of native tobacco, and were apparently unaware of the narcotic properties of pituri. On the other hand, certain tribes used pituri by itself.

The preparation of pituri as a chewing narcotic, appears to have been one in which the leaves were dried, or first "sweated" under a layer of coarse sand and then dried. This material was mixed with gum and the ashes of some other plant or plants, especially *Acacia ligulata,* and made into lumps, usually cigar-shaped, forming "quids." This was chewed. These quids of pituri or of pituri-tobacco mixture, were a valuable article of barter, and the chewing habit was adopted by tribes far removed from the sources of supply as well as those tribes in whose territory the plant or plants occurred.

EFFECTS

There are various accounts of the action of pituri; some writers assert that chewing promoted excitement, and the substance was chewed before fighting, or before any important event; it was also claimed to allay fatigue, and was

said to be used on long and arduous journeys in the manner that the Peruvians used coca. It is, however, difficult to believe that a plant or plants (both belong to the Solanaceae) used as a narcotic with its soothing effects, could also be used as a stimulant, and it is probable that these early accounts have been exaggerated. Most, if not all Solanaceous plants have a depressant action on the human system.

In addition pituri was also used as a game poison, the leafy branches being placed in pools of water for the purpose of poisoning emus and kangaroos. Animals and birds drinking the water became so stupefied that they could be readily killed by natives lying in wait for the purpose.

In 1872 Joseph Bancroft examined pituri, which he found to contain an alkaloid different from that obtained from the related species *Duboisia myoporoides*. Ferdinand Mueller concluded that the pituri alkaloid was similar to, but not identical with nicotine, and in 1880, Liversidge of Sydney, isolated a brown liquid, acrid alkaloid distinct from nicotine, which he called piturine. It should be remembered however that, in some cases at least, the material examined seems to have been the prepared material, and was probably a mixture of Duboisia and Nicotiana. Subsequent work added to this confusion, and it was not until 1935, when Hicks and Le Messurier isolated a new alkaloid, d-nor-nicotine, that the matter was clarified.

Subsequent work carried out by White and Bottomly, under the auspices of the Drug Panel of Western Australia, on 70 samples from various localities between Mullewa and Bencubbin, showed (on dried material) a considerable variation in the nicotine and nor-nicotine contents of pituri. Such dried material varied in nicotine from nil to 5.3 per cent., and in nor-nicotine from 0.1 to 4.1 per cent. The total alkaloids varying from 0.4 to 5.7 per cent., the average nicotine content being 1.3 per cent., and the nor-nicotine content 1.1 per cent., with an average total alkaloid content of 2.4 per cent. From the total of 70 samples, five showed no trace of nicotine. A few samples tested in the field indicated a much higher alkaloid content, the loss upon drying being calculated as from 4.8 per cent. to 1.0 per cent. for nicotine, and from 0.9 to 0.3 per cent. for nor-nicotine. Thus the amounts of nicotine and nor-nicotine determined, may be as much as five and three times respectively, those found in the dried material. A plant with an excess of 25 per cent. of nicotine content is indeed a highly toxic species.

RANGE

The most northerly record we have for pituri is Anna Plains Station on the Eighty-mile Beach. From here it extends southwards, embracing the De Gray, Ashburton, Minilya, Gascoyne and Murchison districts, and extending eastwards into Central and South Australia. Its southern limits can be fairly accurately traced: commencing from Ajana near the Murchison River, this boundary line travels by way of Mullewa, Morawa, Perenjori, Latham, Kalannie, Kulja, Gabbin, Kununoppin, thence to a point between Burracoppin and Walgoolan. It appears to be fairly concentrated along this line, principally in red or yellow sand, sometimes in gravelly soils, and very rarely in the loamy forest soils. Fairly extensive areas occur in the vicinity of Pindar, Perenjori, Payne's Find, Comet Vale, Goodlands and Ghooli.

The virulence of the plant expressed in its toxicity varies considerably. It flowers from August to October, and produces its small black berries in December and January. These berries are eaten by birds, and in this way the plant is disseminated. It germinates freely after summer thunderstorms, and tends to develop vigorously in cultivated land. An objectionable habit is the production of root suckers, so that it is not sufficient to cut the bushes down at the soil level

PITURI.—A, branchlet with leaves, flowers and fruits; B1 and B2, flower and bud—much magnified; C, corolla; D, corolla slit open showing flower corolla lobes and four perfect stamens; E, calyx and ovary after the corolla has fallen; F, fruit (much magnified).

Icon. origin.

and the plants should be grubbed. Cases of poisoning in hay, cut on land previously carrying pituri, are not uncommon. We have no records of pituri from the districts southwards from the Eastern Goldfields Railway except in the vicinity of Carrabin, and towards Higginsville. The species is essentially one of the dry interior and the marginal wheat-growing country.

DESCRIPTION OF THE PLANT

Pituri is usually a shrub varying in height from about six to ten feet; rarely does it assume the aspect of a small tree, with a dark-coloured somewhat corky bark. The bark of the typical shrubby form is as at first smooth, but in age it becomes somewhat corky and yellowish on the lower parts. There is a rich development of branching, the branches being sometimes willow-like, sometimes erect, more frequently drooping towards their tips, and typically a dark purpleish colour.

The leaves are alternately placed, in shape and size they are variable; their usual length is about five inches, but may be much less, tapering at both ends, the lower end provided with a distinct leaf-stalk, and the breadth varying from less than a quarter of an inch to more than one inch (in one form from Mount Narryer).

The flowers are arranged at the apices of the branches, in cymose panicles (see plate). They are somewhat bell-shaped, with individual flower-stalks thickened upwards; the calyx is very small and minutely five-lobed. The corolla is white, with five lobes, the broad tube is striated within with fine purple lines, usually five to each corolla-lobe, and the throat of the tube is hairy. There are four perfect stamens with white anthers, the fifth being represented by a stalk without an anther. The ovary, placed above the base of the corolla is 2-locular, with 6-8 ovules in each compartment. The fruit is black, less than a quarter of an inch in diameter, and contains 1-2 fertile seeds immersed in a dark-coloured pulp—a berry.

The plant takes its name Duboisia from Charles Dubois (1656-1740), a London merchant and patron of botany who collected a large herbarium now at Oxford; the specific epithet commemorates H. Hopwood, of Echuca, a patron of the Victorian Expedition.

THE TOXICITY OF PITURI

The plant is known to be toxic for horses, cattle, goats, sheep and camels. Feeding tests were carried out locally on sheep with material derived from Carrabin. Flowers were fed with negative results, but the leaves were shown to be highly toxic. One sheep drenched with a watery extract of 10 ounces of leaves died within 10 minutes; extract equivalent to three ounces of leaves produced death within two hours, whereas smaller amounts produced symptoms followed by recovery.

Symptoms: Sheep poisoned with pituri showed dullness, trembling and muscular weakness, particularly of the fore legs and neck, the head being carried low, and the ears drooped. When driven the gait is inco-ordinated, and the animal is able to travel only short distances. The fore legs may collapse and the animal falls head first. If undisturbed the animal lies down and may show some evidence of abdominal pain. Death is rapid and occurs quietly in the normal lying position, or may be preceded by the animal lying on its side making occasional galloping movements. There may be regurgitation of ruminal contents before death.

Post Mortem Appearances: In experimental cases the small bowel was intensely inflamed, being diffusely rose-red in places. The lining of the bowel was haemorrhagic and in places covered with a pattern of whitish dead tissue. The changes were most marked in the first several feet of the bowel. There are apparently no characteristic changes associated with pituri poisoning.

MORE WINDMILL SHUT-OFFS

A Few Variations on a Popular Theme

By "MARTINGALE"

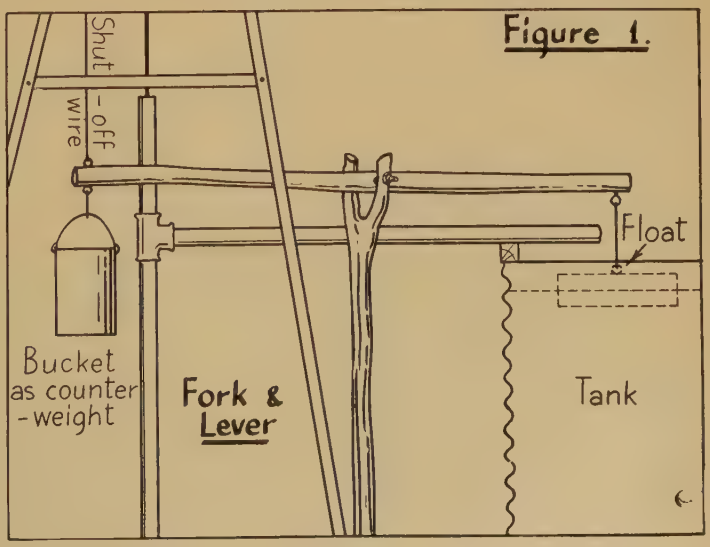
SINCE we printed the description of a type of automatic windmill shut-off used on Abydos Station, Port Hedland, in the issue of December, 1951, several readers of the "Journal" have written to describe alternative methods of pulling a mill "out of the wind" when the tank is filled.

In a number of cases there were variations of the same idea, and in this article the main principles are described, together with some other ingenious gadgets which the author has encountered over the years.

On large pastoral properties where many mills are used, cheapness and simplicity must inevitably demand consideration when installing an automatic shut-off device. One which certainly fills the bill in those respects is the "fork and lever" type, an old favourite among station men, as it can often be made and assembled on the spot from bush timber, and will last for many years with a minimum of attention.

The device, in its simplest form, is shown in Fig. 1. A forked piece of timber is set firmly into the ground about midway between the centre of the mill tower and the tank. The arms of the fork are drilled to take a stout bolt which serves as a pivot on which a horizontal length of timber can move with a see-saw motion.

One end of the horizontal beam carries a float, usually in the form of a substantial block of light wood, and the other end carries a counterweight such as a block of concrete or a drum which can be loaded with stones or scrap iron to give the desired weight. The shut-off wire from the mill-head is attached to



the weighted end of the beam at a suitable point. The float should be sufficiently weighty in itself to raise the counterweight when the water level in the tank drops sufficiently, and the mill is then turned into the wind and operates the pump.

As the tank fills, the float rises and the counterweighted end of the beam is lowered, pulling the shut-off wire and "furling" the mill.

A little trial and error, in the way of increasing or decreasing the weights, or moving them to different positions on the beam, will give effective operation of this idea. The forked timber may be rejected in favour of sawn timber with a suitable pivoting arrangement, and a length of old water-piping or other suitable material could take the place of the horizontal beam.

Here is a good tip from a practical windmill man. Make the various weight adjustments when the mill is in action on a fairly windy day. It will often be found that a mill needs a lot of weight to shut it off when it is not working, but may be furled quite easily when it is revolving freely. Obviously, excess weight is undesirable.

THE DISTANCE FACTOR

The fork and lever method is obviously best suited to layouts where the tank is situated fairly close to the mill. A double lever idea is sometimes used where the distance is too great for a single lever, and an idea of this method is shown in Fig. 2. The beam operating the shut-off wire is loosely attached to the tower framework by means of a U-bolt or similar link and may itself provide sufficient weight to counter-balance the float. If not it is a simple matter to add extra weight.

The rest of the set-up is similar to that used for the single lever idea, save that the two levers are loosely connected by means of two eye-bolts carrying a few links of chain.

Perhaps a better method to use when the tank is some distance from the mill, is that shown in Fig. 3. Here, two right-angled pieces of 2in. x ½in. iron are used,

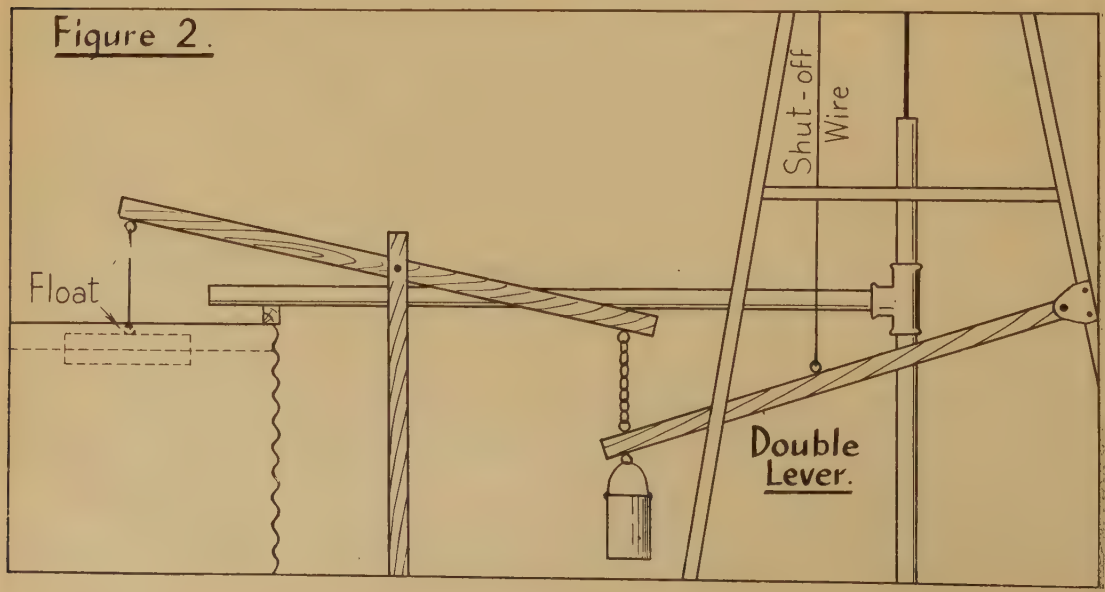
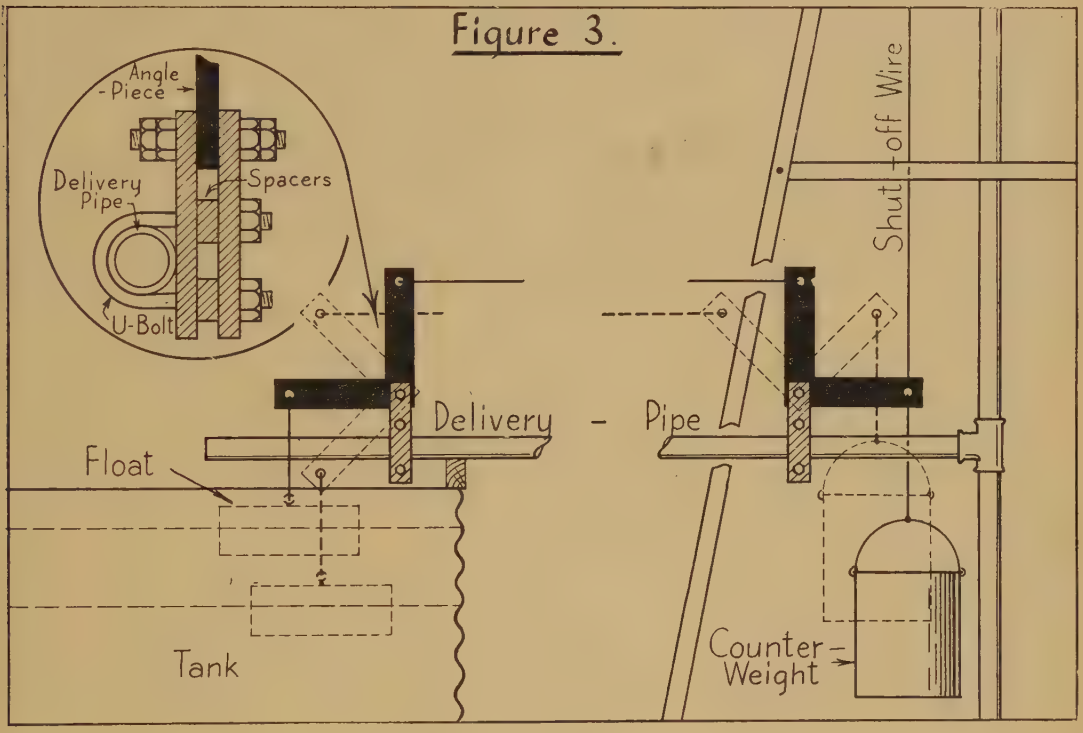


Figure 3.



as shown, to vary the direction of the pull caused by the lowering of the float in the tank. The angle-pieces each have three holes drilled in them, one near the corner to take a half-inch bolt to serve as a pivot, and one hole at each end to take a ring or link for attachment of the necessary wires.

Where it is desired to attach the fittings to the delivery pipe direct, two U-bolts and four pieces of strap-iron each drilled with three holes as shown in the inset, could be used.

In the diagram, the tank is full to within a few inches of the rim and the mill is out of the wind. As the water level drops and the float drops with it, the angle-pieces assume the position indicated by the dotted lines. This slackens the tension on the shut-off wire and the mill swings back into the wind.

DUAL-PURPOSE SHUT-OFF

One farmer found himself faced with a knotty problem. He had a mill erected over a well which, although it never dried up, was rather slow in "making," so slow in fact that the mill often pumped the well dry.

His problem was to make an automatic shut-off which, besides playing the normal role of pulling the mill out of the wind when the tank was full, would also save wear and tear by stopping the mill as soon as the water in the well got too low for pumping.

Being an ingenious type, he tackled the dual problem in this manner. First he extended the shut-off lever so that it faced into the tower and was pointing directly over the well. On the end of the lever he attached a wire, and to the end of the wire he hung a four-gallon

drum containing three gallons of water to give it extra weight. The bung of the drum was then securely sealed and it was lowered into the well. The wire was of such a length that the weight of the drum pulled the mill out of the wind just before the water level dropped below the bottom of the pipe. As the well "made" and the water level rose, the drum floated and allowed the mill to come into action again.

For the shut-off to come into operation when the tank was filled, he used the old float idea in a somewhat different manner. He put a beam across the mill tower to carry a pulley-block and spanned the tank with another beam also fitted with a pulley. A flexible wire ran from the float in the tank over the two pulleys and down the inside of the tower to a suitable counter-weight and from there to the shut-off lever.

A little trial and error experimentation was needed to get the float and counter-weight suitably adjusted, as the counter-weight had to be heavy enough to hold the mill out of the wind, even when the floating drum in the well had risen to a height which would normally bring the mill into operation. The principle of the idea is shown in Fig. 4, and various modifications of the idea will probably suggest themselves to the user.

Figure 4.

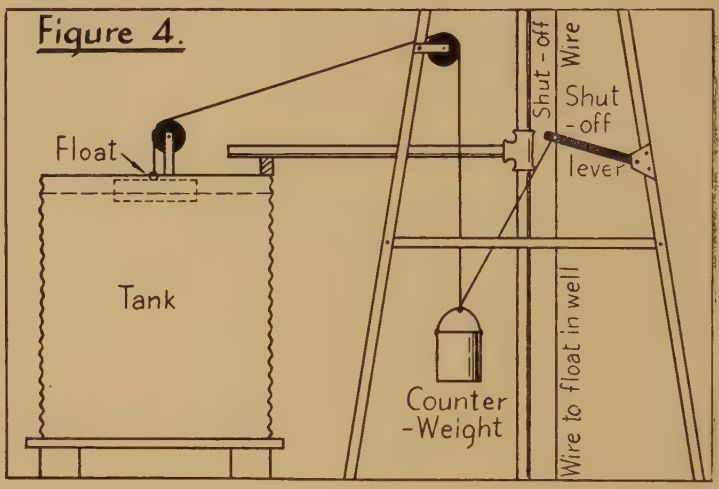
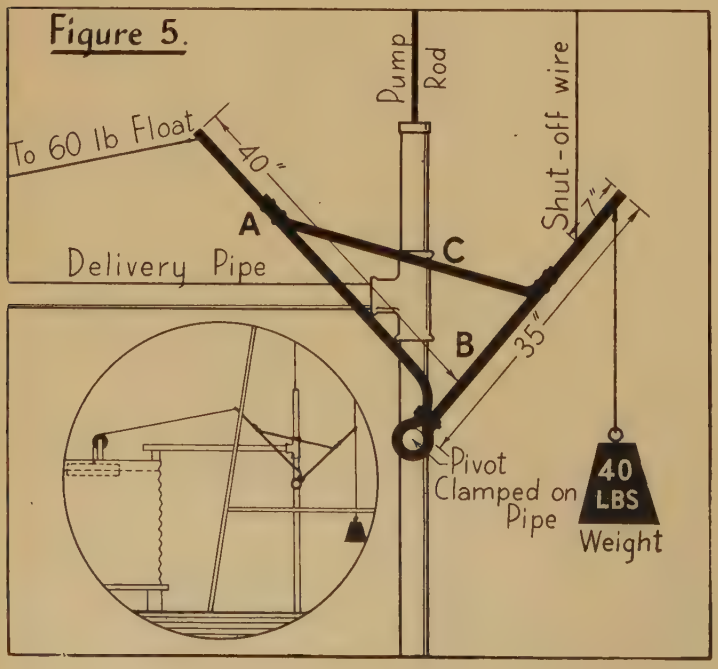


Figure 5.



A COMPACT DESIGN

An idea, which I believe originated in South Australia many years ago, is shown in Fig. 5. It is really a refinement of our old friend, the fork and lever method, but has the advantage that it can be made in large numbers in the farm or station workshop and fitted as required. It is

reasonably portable and is convenient to use where timber is in short supply.

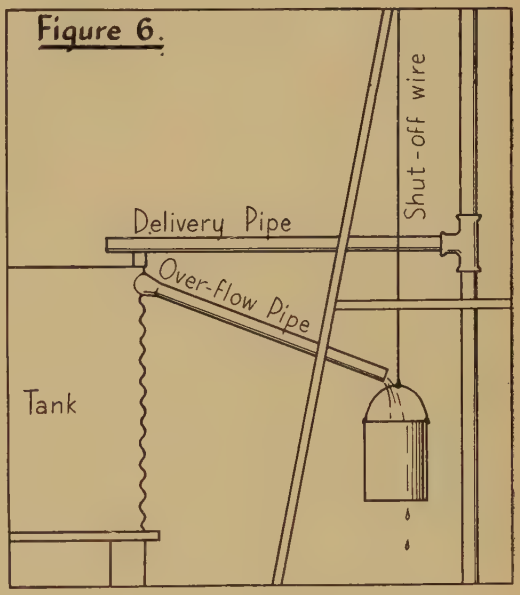
Almost any suitable lengths of scrap metal could be utilised, but stuff about 1½in. x ½in. would probably be the handiest. A length of about 7ft. is bent as shown so that it fits over a pivot clamped to the pipe. Arm (a) measures 40in. as indicated by the dotted line, and arm (b), which is almost at right angles, is 35in. in length. A stay (c) is bolted between them to give rigidity.

The shut-off wire is attached to arm (b) at a point 7in. from the end, and a counterweight weighing about 40lb. is attached to the end to offset a float weighing 60lb. in the tank. A pulley will be needed, fitted as shown in Fig. 4, to ensure free working of the float wire.

ROUGH AND READY

A very simple "bush" method, which is often used when the tank is situated close to the mill, is illustrated in Fig. 6. This is a five-gallon drum suspended from the shut-off lever of the mill. An overflow pipe is connected to the top of the tank and carried down to a point immediately over the drum. When the tank fills, the overflow pipe allows water to run into the drum so that its weight then shuts off the mill. A nail-hole punched in the bottom of the drum allows the water to leak away slowly until the decreased weight permits the lever to rise again, bringing the mill back into the wind.

Figure 6.



PIGS AND MEN

"My many and varied contacts with pigs and men often remind me that they have much in common. Both of them respond and react to the same kind of treatment. As it suits their purpose they are individualists or otherwise. They can both be perverse or tractable, according to the mood of the hour. Either of them will squeal and raise the deuce when nothing is hurting them or bear real hardship in silence.

"Have you ever watched a group of baconers on a coldish morning snuggling closely together in their stye so as to share the warmth of their bodies? That represents the pig's idea of co-operation. Pour a pail of milk in their trough and instantly there will be a wild scramble for the biggest mouthful! The co-operator has become an individualist. Self interest. How like men! When we wish to effect a purpose, we form a co-operative society. Let someone offer a tempting bait and away go principles, and business to the highest bidder. How many promising co-operative ventures have gone into liquidation for the same reason."—W. J. Croucher in "My Friend the Pig."

Fig. 1—A classic example of biological control. The top picture shows an abandoned selection at Chinchilla, Queensland, in May, 1928, when the prickly pear had taken charge. Below the same scene is photographed in October, 1929. The prickly pear has been destroyed by Cactoblastis cactorum, a moth imported from South America.

INSECT Pests AND THEIR CONTROL

by C. F. H. JENKINS, M.A. *(Government Entomologist).*

METHODS of insect control are sometimes classified under the four following headings—Quarantine, Cultural Methods, Biological Control and Chemical Treatments. Each method has its own particular part to play in preventing the spread and multiplication of insect pests and it is essential for maximum results that everyone—whether he be a commercial grower or a backyard gardener—has a general understanding of the principles involved.

QUARANTINE

There is a tendency for many people to regard quarantine as a function of the Government and to leave the matter entirely to authorised officials. Most regulations make dull reading and the quarantine literature is no exception; consequently few people are even aware of the existence of many of the regulations, much less the reasons for their promulgation.

The isolation of Australia as a whole, and Western Australia in particular, has meant that many almost world-wide pests have so far failed to become established on this continent and that where they have done so some have failed to reach Western Australia. The rapid improvement of transport facilities in recent years has done much to bridge the gap between continent and continent and between State and State, and in consequence the importance of effective quarantine measures has greatly increased. It will be necessary to take only one or two examples to illustrate this point.

The codling moth for instance is a major pest of apples and pears, which is widespread in the main apple-growing countries of the world, but which so far has failed to colonise Western Australia. This State's fortunate position has been maintained by a total prohibition on the importation of apples, pears and quinces from outside sources. The fact that numerous outbreaks of codling moth have occurred in Western Australia in the last 50 years reveals a weakness in the quarantine system, but complete eradication of all but the most recent outbreaks indicates the value of the system as a whole.

Co-operation is Important.

One of the primary weaknesses in general quarantine is the lack of public co-operation. The difficulty of inspecting all interstate luggage (for instance) is self-evident and consequently there is ample opportunity for people to bring apples into Western Australia or to take other fruits to the Eastern States. South Australia, it should be noted, is not concerned about keeping out codling moth

as the insect is already firmly entrenched. On the other hand, fruit fly is greatly feared and in recent years approximately £500,000 has been spent on eradicating this pest, and strict precautions are being observed to prevent further introductions. Within our own State the movement of fruit is restricted from the metropolitan area to such major apple-growing districts as Bridgetown and Mt. Barker, again with a view to preventing the permanent establishment of the Mediterranean fruit fly in the southern portions of the State.

In the stock industry buffalo fly and cattle tick are of major importance, and both pests are well established in our Kimberley Division. The movement of cattle to the clean southern areas is only allowed for slaughter and then only in accordance with specified spraying or dipping regulations.

What applies to international or interstate quarantine applies to a lesser degree to individual properties. Care should be taken to see that clean material only, whether it be plant or animal, is introduced on to a farm or an orchard. Suspect animals or plants should be treated for the particular trouble in question and kept isolated until all risk is passed.

The foregoing examples will have illustrated the importance of quarantine measures and the savings which they can mean to all members of the community.

The ever-increasing volume of air traffic is creating a special hazard and emphasises still further the necessity for public co-operation. What is required

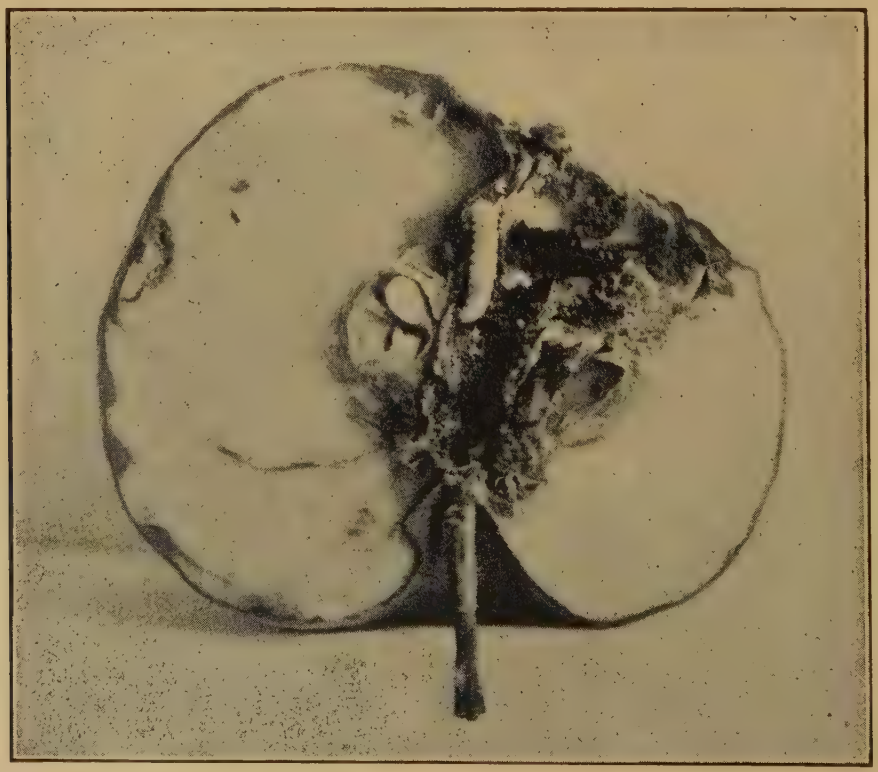


Fig. 2.—An apple cut open to show the damage caused by the codling moth caterpillar.

is that all members of the community should comply with quarantine regulations, whether the reason for the particular restriction is obvious or not, and that specimens of any suspect insect should be forwarded to the Department of Agriculture for identification. The prompt submission of specimens has enabled numerous pests to be dealt with before they become established and the public's responsibility in this regard cannot be over-emphasised.

CULTURAL METHODS

Clean Cultivation and General Hygiene.

Cultural practices may have a very important effect upon insect activity and so wherever possible such methods should be modified in order to reduce pest species to a minimum. Dirty borders and weedy plots will render the control of snails, red mite and cutworms an almost impossible task, whereas clean cultivation will greatly reduce the necessity of chemical treatments.

A corollary of clean cultivation is that useless plants should always be destroyed as soon possible. For instance, when cutting cabbages and cauliflowers, the butts should be pulled up so as not to serve as further breeding places for cabbage moths and aphis.

What applies in a small garden has equal application on a large scale and the planting of crops on clean fallow will greatly reduce the danger of insect damage. This is particularly so in the case of leguminous crops where severe damage from red mite and lucerne flea may result on ploughed-in land. Webworm injury to wheat is also closely related to cultural methods and will be elaborated in a separate article in the near future.

Crop Rotation.

If the same kind of crop is grown time after time on the same area of land, insect and allied pests have a perpetual food supply available and may increase progressively with each succeeding crop. By following one crop with some totally unrelated plant, however, certain types of insects can be completely checked. For instance, although cabbages may be severely attacked by the cabbage moth, potatoes or carrots could safely follow in the same plot, whereas cauliflowers or brussels sprouts would be susceptible to many cabbage pests. Again tomatoes, cape gooseberries, tobacco and potatoes have a common pest in the potato moth and so do not make an ideal rotation.

Resistant Varieties.

The development and use of resistant varieties may perhaps be included under the heading of cultural methods. The principles of resistance have been exploited more efficiently in connection with certain plant diseases than with insect pests, but resistance is by no means unimportant in the latter field.

One of the most outstanding local applications of the principle is in connection with woolly aphis control on apple trees. This aphis attacks not only the twigs and branches but also the roots of apple trees, consequently when the aerial forms of the insect have been dealt with, re-infestation from the roots may occur. Certain types of apples, however, are unfavourable to the development of woolly aphis and these types are widely used as root stocks.

Amongst the best known of the resistant apple varieties may be mentioned the Northern Spy, the Winter Majetin and the Irish Peach, but the Northern Spy is the main root stock used in local orchards. Turning to vines we find the use of resistant stocks for Phylloxera is also a common practice in many countries. The insect is not established in Western Australia but, in view of the possibility of its entrance, a reservoir of wild vine stocks is being built up for immediate use should the necessity arise.

In the case of vegetables, local examples of resistance are less spectacular than have been cited for fruit, but most readers will know how susceptible

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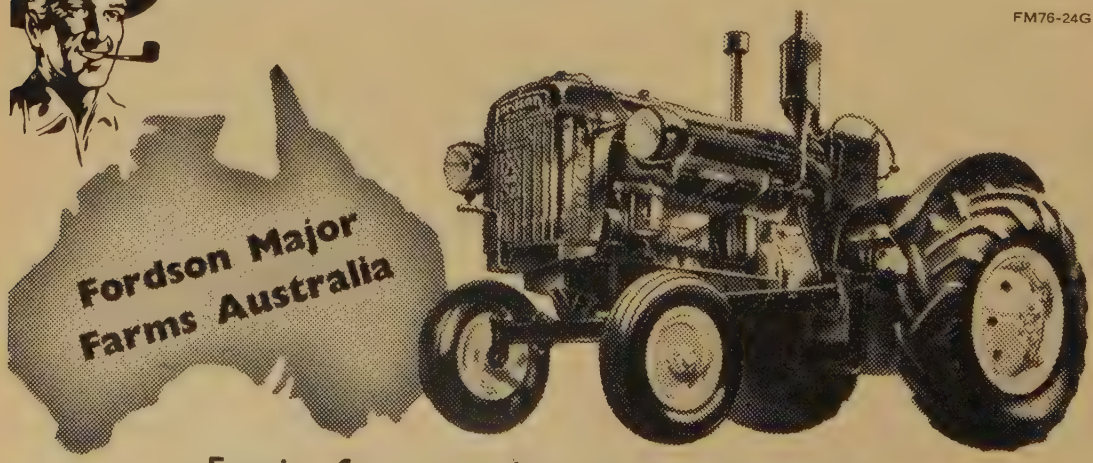

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certain seedlings are to red-legged earth mite injury and how other crops suffer but little damage. This experience can often be put to good use in choosing crops for particular situations and seasons.

BIOLOGICAL CONTROL

No method of combating pests has appealed so generally to the popular fancy as that usually known as biological control. This is readily understandable for it involves the use of one creature to subject another and reduces to a minimum all manual labour. Despite their wide appeal, the principles of biological control are by no means generally understood and the very popularity of the method sometimes leads to the appearance of the most extravagant claims or unreasonable criticisms.

Fig. 3.—Cabbages being dusted with a hand-operated rotary duster

Many of the most outstanding successes with biological control have been achieved under insular conditions. The Hawaiian Islands probably offer the best examples, followed by Fiji and New Zealand. Where pests have become widely established on a continental land mass the chances of successfully introducing parasites are seriously limited. The new environment presents such a complex of factors, biotic, climatic and physiographic, that no single parasite or predator is likely to be of more than local significance. This does not mean that successes have not been achieved on large land masses, such as America and Australia, but in these instances the introductions have been made into areas which may be regarded as distinct ecological entities. South-Western Australia is generally

recognised as an ecological island and possessing a warm equable climate and a certain degree of physiographic isolation it conforms with the main requirements necessary for the successful establishment of parasites.

The successful control of prickly pear in Queensland is perhaps the most outstanding example of successful biological control. This success has led to a widespread belief that every pest, insect or weed may be overcome by biological control methods if a sufficient search is made for parasites. There is no evidence whatever to support such a contention. Few insects or plants are free from the attack of natural enemies, but this does not mean that they are entirely controlled by such or, what is more important, that when an organism is introducted into a completely new and favourable environment that such an environment will necessarily be favourable to the establishment of parasites and predators.

It is against introduced pests that biological control offers the most promise. Native insects have their own natural enemies, but when such insects assume pest proportions it is usually some particularly favourable alteration in the local environment rather than an absence of parasites which brings about the change. The little plague grasshopper of the dry wheatbelt for instance has assumed importance because of extensive clearing and the resultant appearance of vast breeding grounds and an abundant food supply. This grasshopper favours hard bare soil for egg-laying and feeds extensively on grass and cultivated cereals. When breeding areas were limited to roadsides and bush clearings, parasites and predators could keep down grasshopper numbers, but with extensive acreages of uncultivated grazing lands for egg beds the problem is entirely changed.

When investigating the possibility of controlling a pest by biological means, the following points must be considered:—

1. Is the pest troublesome in its native home? If not, is it controlled there by natural enemies?
2. Are all or any of the natural enemies established with the pest in its new environment? If not, can they be successfully introduced?
3. Are the parasites and predators under consideration specific in their feeding habits or will they attack a variety of hosts?
4. Is there any likelihood of any introduced parasite or predator proving troublesome in its new surroundings? (This is particularly important in the case of weed control, as parasites may attack not only weeds but closely related plants of commercial importance.)

It is only after these and various other points have been satisfactorily answered that any move can be made to undertake a programme of biological control and then the chances of outstanding success are by no means assured.

In Western Australia one of the most outstanding achievements in the way of parasite introductions was the control of woolly aphis on apple trees by the wasp Aphelinus mali. Various other insects including the green tomato bug, the white cabbage butterfly and the cabbage moth are partly controlled by parasites, but in the field of weed control there is little to report. A leaf-eating beetle (Chrysomela gemmellata) has been established on St. John's Wort in several districts in the lower South-West with some localised success, but generally the progress of the beetle has been slow.

INSECTICIDES

In order to use insecticides with maximum efficiency growers should study carefully the habits of the various insect pests and pay particular attention to their methods of feeding. Injurious

SPRAY COMPATIBILITY CHART

	Lead Arsenate	Calcium Arsenate	Paris Green;	Cryolite	Rotenone	Pyrethrum	Nicotine	DDT	Chlordane	BHC	Toxaphene	TEPP	Parathion	Summer Oil	Dormant Oil	Dinitro Cmpds.	Lime Sulphur	Wettable Sulphur	Lime	Fixed Coppers	Bordeau Mixtures	Dithiocarbamates
Lead Arsenate ...		F	F	F	F	F	F	F	F	F	F	Q	F	F	Q	Q	C	F	F	F	F	F
Calcium Arsenate	F		F	N	C	C	F	F	Q	N	Q	N	Q	F	Q	Q	F	F	F	F	F	Q
Paris Green ...	F	F		N	N	N	F	F	F	F	F	N	Q	Q	Q	Q	N	N	F	F	F	N
Cryolite	F	N	N		F	F	N	F	F	F	F	Q	Q	F	Q	Q	N	F	N	Q	N	F
Rotenone ...	F	Q	N	F		F	F	F	F	F	F	Q	F	F	Q	Q	N	F	N	F	F	F
Pyrethrum ...	F	Q	N	F	F		F	F	F	F	F	Q	F	F	Q	Q	N	F	N	F	F	F
Nicotine ...	F	F	F	N	F	F		F	Q	Q	F	Q	F	F	Q	Q	F	F	F	F	F	F
DDT*	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	N	F	N	F	F	F
Chlordane ...	F	Q	F	F	F	F	Q	F		F	F	F	F	F	F	F	Q	F	N	F	Q	F
BHC	F	N	F	F	F	F	Q	F	F		F	F	F	F	F	F	N	F	N	Q	N	F
Toxaphene ...	F	Q	F	F	F	F	F	F	F	F		F	F	F	F	F	Q	F	Q	F	Q	F
TEPP	Q	N	N	Q	Q	Q	Q	F	F	F	F		F	F	F	Q	N	F	N	Q	N	Q
Parathion ...	F	Q	Q	Q	F	F	F	F	F	F	F	F		Q	F	Q	Q	Q	N	F	Q	F
Summer Oils* ...	F	F	Q	F	F	F	F	F	F	F	F	F	Q		F	N	N	N	F	F	F	F
Dormant Oils ...	Q	Q	Q	Q	Q	Q	Q	F	F	F	F	F	F	F		F	N	Q	Q	F	F	F
Dinitro Cmpds ...	Q	Q	Q	Q	Q	Q	Q	F	F	F	F	Q	Q	N	F		Q	Q	Q	Q	Q	F
Lime Sulphur ...	C	F	N	N	N	N	F	N	Q	N	Q	N	Q	N	N	Q		F	F	N	N	Q
Wettable Sulphur	F	F	N	F	F	F	F	F	F	F	F	F	Q	N	Q	Q	F		F	F	F	F
Lime	F	F	F	N	N	N	F	N	Q	F	Q	N	N	F	Q	Q	F	F		F	F	Q
Fixed Coppers ...	F	F	F	Q	F	F	F	F	F	Q	F	Q	F	F	F	Q	N	F	F		F	Q
Bordeau Mix. ...	F	F	F	N	F	F	F	F	Q	N	Q	N	Q	F	F	Q	N	F	F	F		Q
Dithiocarbamates	F	Q	N	F	F	F	F	F	F	F	F	Q	F	F	F	F	Q	F	Q	Q	Q	

F—Fully Compatible and may be mixed together for application.
C—Compatible, but may decompose on standing for any length of time. Apply immediately after mixing.
Q—Questionable compatibility. Mixtures not recommended.
N—Not Compatible. Should be applied separately, in most cases with long intervals between applications.
* Mixtures of DDT and Summer Oils have produced serious burning on apple foliage.

insects may be divided roughly into two groups according to the nature of their mouth parts, viz. (1) biting insects such as caterpillars and grasshoppers which bite and chew their food, and (2) sucking insects such as aphis, bugs, and scale insects which imbibe the plant sap by means of a beak or proboscis.

If the insect is of the chewing type, a stomach poison such as arsenate of lead is usually applicable, but if the pest is a sucking one such poisons are useless, because the insect can insert its beak through the poison and drink the uncontaminated sap. For sucking insects, therefore, contact sprays and dusts are recommended, and those containing nicotine are amongst the most effective and widely used.

Having discovered to what feeding type the insect belongs, and if possible the exact species concerned, so that its habits and life history can be discovered, one is in a position to decide how to combat the pest. A caterpillar such as the cabbage moth larva, which spends its whole life on the plant, and eats large amounts of foliage, would be controlled by coating the leaf surface with arsenate of lead dust or spray. A cut-worm, on the other hand, which lives much of its time in the soil and cuts the plant off at ground level, is best combated by poisoned bran baits spread around the plants. Snails are also best dealt with in this manner.

Aphis and bugs must be hit directly with a contact dust or spray, and a constant watch should be kept for fresh infestations.

The manner and time of applying insecticides has almost as much effect upon the degree of control obtained as the kind of insecticide used.

At the very first sign of trouble a thorough treatment should be given, for many insects multiply so rapidly that once they have become firmly established much damage can be done before they can be brought under control.

Fig. 4.—Cabbages being dusted with D.D.T. powder by means of a wheelbarrow duster

The necessity for prompt action is particularly urgent in seed beds, for a dirty seed bed may result in the infestation of the entire crop when planted out.

In applying dusts and sprays, as complete a cover of the foliage as possible should be aimed at, not forgetting the under surface of the leaves, for many insects prefer to feed in this more sheltered situation. Calm fine weather should be chosen whenever possible, as wind is

liable to cause much waste of material, and, of course, a shower just after treatment may nullify all the good work.

Dusts are often applied with a special dust gun or blower, but such equipment is not necessary for a backyard garden. The material can be placed in a bag or some other cloth container of suitable texture, and the dust shaken on to the plants through the meshes of the bag.

Where orchard sprays are being applied good power equipment is definitely recommended. It is necessary to thoroughly cover the trees and in the case of contact sprays to saturate the undersides of the leaves. This can only be done with high pressure sprays and there is no doubt that much of the poor control which follows some spraying is due to poor equipment and careless operators.

In the case of insecticides, either dusts or liquids, containing nicotine the best results will be obtained during warm fine weather, for the nicotine fumes are liberated slowly on a cold cloudy day.

Before leaving the general question of contact insecticides it may be helpful to know in what way they affect the insect. In some instances toxic elements are actually absorbed through the body wall of the creature. Nicotine depends to a large extent upon its fumigatory action; but soap and oil sprays interfere with the breathing operations of the animal. An insect, it should be remembered, does not breathe by means of a nose and lungs as do the higher animals, but by means of a system of ramifying tubes which open to the surface as a series of holes or breathing pores along either side of the insect's body. If these holes are clogged by a spray film death from suffocation is the result.

NEW INSECTICIDES

Under this heading will be grouped D.D.T., B.H.C. and all the organic insecticides developed during and since World War II. Such rapid strides have been made in the insecticide field in recent years that it is impossible to give all the latest information in an article such as this. The most salient features of the better known chemicals will be outlined, however, together with some general recommendations as to their use.

D.D.T. (Dichloro-diphenyl-Trichloro-ethane).

The use of D.D.T. as an insecticide ranks as one of the outstanding discoveries of the war period for, although the material was first prepared by a German chemist in 1874, it was not until 1939 that its vast potentialities as an insecticide were foreshadowed.

D.D.T. is a contact as well as a stomach poison and unlike other insecticides in common use has the advantage of remaining effective as a spray or dust film for a considerable period. It is slow in action, however, and signs of distress may not be noticeable in an insect for half an hour or more after receiving a lethal dose, while death may be delayed for a much longer period. D.D.T. should not be mixed with lime or alkaline materials as its efficiency may be seriously affected.

D.D.T. is toxic to mammals and consequently should be handled with care. Oil solutions are readily absorbed through the skin and therefore are unsuitable for the treatment of animals excepting under special circumstances. Dusts and emulsions are much safer and are available in forms suitable for use both on plants and domestic animals.

D.D.T. is highly toxic to fish and many other cold-blooded creatures.

B.H.C. (Benzene-hexachloride, 666 or "Gammexane").

Like D.D.T., Benzene-hexachloride is insoluble in water and so is used either in specially prepared emulsions or dust formulations. It has not the same residual effect as D.D.T. for spray purposes, but as a soil insecticide may remain active for several months. Crude B.H.C.

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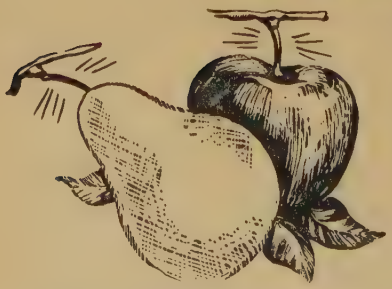

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has a musty smell and may taint vegetables and fruit under certain conditions.

The pure gamma isomer of B.H.C. has been commercially manufactured under the name of Lindane. This refined product lacks the disagreeable musty odour of crude B.H.C. and is much less liable to affect plants and seeds.

Chlordane.

Chlordane may act as a stomach poison, a contact insecticide or a fumigant. This chemical was developed in America in recent years and so far is not procurable on the local market. It is insoluble in water but easily soluble in kerosene. Its residual action is of shorter duration than that of D.D.T., but its fumigatory properties often produce quick results. It has shown particular promise against grasshoppers and Argentine ants and should prove a useful addition to local insecticides when readily available in Australia.

Aldrin.

Aldrin is one of the newer insecticides which is not yet procurable on the local market. It is insoluble in water, but highly soluble in most organic solvents. Its residual action is somewhat less than Chlordane, but it has been reported

Fig. 5—Spraying orchard trees with a modern tractor-drawn outfit operated by the power take-off.

to be effective against quite a wide range of insects including ants, mosquitoes and housefly larvae and thrips.

Dieldrin.

Dieldrin is reported to be one of the most promising insecticides yet developed. It has protracted residual action and a pronounced fumigatory effect. It has given striking results aginst flies, mosquitoes, ants and ticks. It is insoluble in water, but may be used as an emulsion or a dust preparation.

H.E.T.P. (Hexa-ethyl-tetra-phosphate).

This material is sold locally under the name of "Hexone." It is a very good substitute for Nicotine Sulphate and was developed in Germany during the war for this purpose. It is very effective against aphis and red spider and in the concentrated form is highly toxic to both insects and mammals. It mixes readily with water, but hydrolises rapidly and must be used within an hour of mixing. It has some fumigatory action as well as being a contact spray.

Parathion or E. 605.

Preparations of Parathion are sold locally under the names of "Folidol" and "Phosphone." This new insecticide is particularly effective against various mites and is toxic to a wide range of insects. It is used mainly as a contact insecticide but has some onicidal and stomach poison properties. Is said also to have some fumigatory action and to possess some of the properties of a systemic insecticide.

Systemic Insecticide.

Under this heading may be grouped a number of insecticides which are actually absorbed by the plant and carried in the sap to the young growing shoots. Such materials may kill aphis and other sap-sucking pests several weeks after being applied to a plant.

Pestox III is one of the best known of the systemic group. It is highly toxic to humans and so far has only been used in Australia on an experimental scale.

PLANT INJURY

Many of the new insecticides may produce phytocidal effects if used at high concentrations. Most of the commercial preparations, however, are available in forms suitable for orchard and market garden use. Certain plants are particularly susceptible to some insecticides and conditions of growth may also produce varying results.

Melons, cucumbers and their relatives are adversely affected by D.D.T., especially in the seedling stages. Young beans and young tomatoes may also react adversely to D.D.T. treatments.

High concentrations of B.H.C. both as soil dressings and foliage treatments have been reported to cause dwarfing to various plants. No serious effects, however, have been noticed following the light treatments used locally. Off flavours have been reported in fruit and vegetables following the use of crude B.H.C. The musty odour of the crude material also renders it unsuitable as a household insecticide but the development of the refined product Lindane has largely overcome these drawbacks.

Parathion has been reported to cause some injury to apple foliage and to produce off flavours in certain vegetables.

H.E.T.P. is not recommended for use on tomato plants as adverse growth effects may follow its application.

EFFECT OF INSECTICIDES ON THE BALANCE OF NATURE

The fact that the widespread use of modern insecticides presents a hazard to useful insects as well as birds, fish and other natural fauna cannot be denied. The new materials are so much more effective than their predecessors in controlling pests, however, that it is quite out of the question to ban their use.

In order to reduce to a minimum the impact of these lethal products upon our fauna the following rules should be observed:—

1. Potent insecticides such as D.D.T. or the organic phosphates should only be used when satisfactory control cannot be achieved by other means.
2. These insecticides should be used at the minimum efficient dosage.
3. They should be used over relatively restricted areas.

Much more information is still necessary before all the possible repercussions which may follow the general use of organic insecticides can be interpreted. The liberal use of D.D.T. has led to outbreaks of red spider and other mites presumably because the natural enemies of these creatures are more susceptible to D.D.T. than the mites themselves.

The reduction of insect pollinators such as bees has also been associated with D.D.T. and other treatments. Fish, frogs and other cold-blooded creatures are highly susceptible to D.D.T. in quite low concentrations, and cumulative effects may occur in some of the higher animals.

In planning wholesale eradication schemes for mosquitoes, forest insects and other widespread pests all aspects of the problem must, therefore, be considered.

Although the most pessimistic forecasts have been made concerning the effect of D.D.T. and other modern insecticides upon the balance of nature they have not all been fulfilled. The future is still somewhat obscure, but there is little doubt that the grower himself will be one of the most potent deciding factors. The careful and intelligent use of modern insecticides should result in little serious upset in the natural balance whereas the careless and wholesale application of these materials may spell something approaching disaster.

RESIDUES

The likelihood of heavy residues accumulating on vegetables and fruit after repeated applications of insecticides must not be overlooked. In the case of fruits and vegetables, arsenic, D.D.T. and other toxic materials should not be applied within six weeks of harvesting the crop. Where later treatments are necessary relatively harmless materials such as derris should be used or materials with poor residual qualities such as nicotine sulphate and H.E.T.P.

GENERAL WARNING

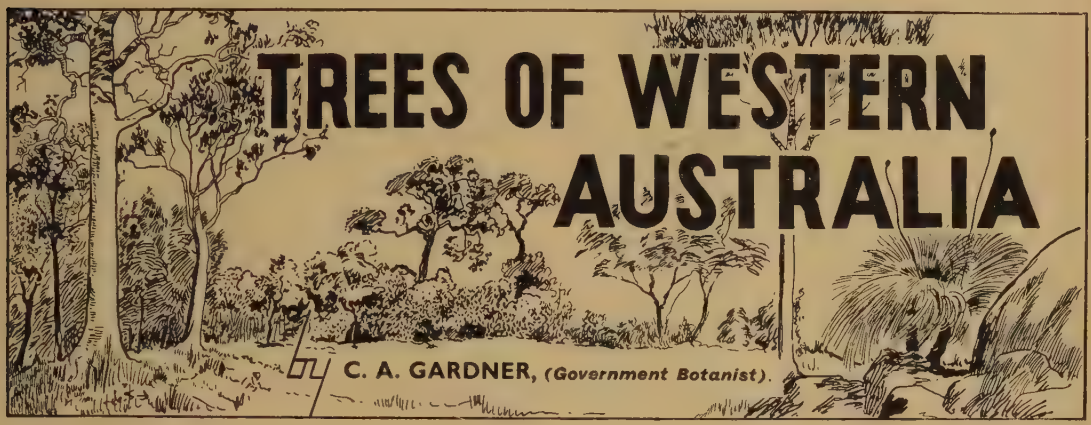
Most of the insecticides in modern use are toxic to humans and the higher animals. Many of them may be absorbed through the skin without any obvious irritation at the point of contact. D.D.T. is a cumulative poison and may become concentrated in the fat. There is evidence that the continued feeding of contaminated material to dairy cows may result in the appearance of D.D.T. in the milk.

Most of the organic phosphates such as H.E.T.P., Parathion and Pestox III are highly toxic to humans and the concentrates should be handled with the greatest care. Special precautions should be taken when handling all concentrated insecticides to see that they are not splashed on to the bare skin. Operators should also not inhale the spray mist or allow their clothing to become saturated with liquid.

All exposed parts should be thoroughly washed with soap and water after using either dusts or sprays and workers with insecticides should take as a warning any signs of headache, giddiness or nausea during operations.

The old saying "Familiarity breeds contempt" is particularly applicable where insecticides are concerned, but growers should handle all products with care and comply strictly with any safety precautions recommended by the manufacturers.

A Road through the Karri Country



TREES OF WESTERN AUSTRALIA

By C. A. GARDNER, *(Government Botanist).*

IN commencing this series, in which a large number of trees will be dealt with, first place must be given to the species of Eucalyptus which include, besides the gum-trees, the various shrubs and mallees which make up a considerable part of the woody flora of South-Western Australia.

It is hoped that these articles may prove of interest and value, for apart from the trees which provide us with our local timber, some species of *Eucalyptus* yield valuable tannins, and a number, especially the mallees, are valuable for the oil which they contain in their leaves, and for their pollen and nectar which are of primary importance to the apiarist.

DESCRIPTION

And so, in the first place, it is as well to consider just what constitutes a *Eucalyptus*. They are all woody plants —that is they are trees or shrubs—and all have simple entire leaves of more or less leathery texture. The leaf has a single midrib or central nerve, and typically what are termed lateral nerves which arise and diverge from this midrib usually to terminate in what is termed an intramarginal nerve which may be close to, or remote from the leaf-margin. In some tropical species there are two intramarginal nerves.

The lateral nerves may be more or less parallel, or *anastomose,* with one another, forming a network of nerves, sometimes distinct, sometimes obscure, and sometimes the intramarginal nerve may be so close to the leaf-margin as to be contiguous with it. The leaf consists typically of a leaf blade or *lamina* attached to the branchlet by a special stalk or *petiole,* frequently twisted, so that the leaf assumes a vertical pendulous position; at other times the leaf is stalkless or *sessile,* and in a few species two opposite leaves may be joined at their bases *(connate)* to resemble a single leaf pierced by the branchlet. The position of the leaves is usually *alternate,* i.e., on opposite sides of the branchlet but placed one above the other; at other times they are strictly *opposite* to each other.

The presence of oil in the fresh leaves may be detected by holding them up to the light, when the oil cavities will appear as translucent dots. In the dried leaves this character is not usually evident, but there may be some indication of oil as dark spots, or minute depressions on the leaf-surfaces.

The leaves are usually of the same colour on both surfaces, when they are said to be *concolorous,* or they may be

dark above and paler underneath. They are typically smooth and without hairs *(glabrous)*, or they may have a sparse covering of short rigid hairs.

Flowers.

The arrangement of the flowers is usually constant in any given species, and the terms used may be understood with reference to the plates accompanying the articles; usually the flowers are arranged at the top of a stalk which arises from the point of junction of the leaf and branchlet (the leaf *axil*). This stalk is termed the *peduncle*. The flowers may each possess their own special stalk (*pedicel*), or may be stalkless, when they are said to be *sessile*. The pedicels, or the sessile flowers in most cases are clustered at the top of the peduncle; when pedicellate, the group *(inflorescence)* is an *umbel*; when sessile, the flowers are in a head, and termed *capitate*.

The *Eucalyptus* flower is a simple structure, for there are no sepals and petals. The lower part of the bud, which becomes the cup of the flower, and enlarges or hardens to form the fruit is termed the *calyx-tube*, and is usually *truncate* or flat at the summit. Occasionally the sepals are represented by four small teeth close to or at the summit of the calyx-tube, and these are always four in number. They may be seen to advantage on a number of tropical species, and on the Tallerack of the southern sand-heaths between Albany and Esperance, or again on the Illyarrie *(Eucalyptus erythrocorys)*. The petals are quite absent, but their place is taken by a bud-cap, called the *operculum*, and this is probably derived from the hardened and concrete petals. It is indeed this *operculum* that is the most characteristic feature of *Eucalyptus*, and from which the genus derives its name—*eu* = well, and *kalyptos* = covered.

When the bud cap falls off at *anthesis* (flowering time) the stamens expand. These consist of a stalk or *filament*, and at the top an *anther* which contains the pollen. The anther opens by two cells, or by circular or elliptical pores; most frequently these are longitudinally parallel to each other. Sometimes by upward confluence they appear as a single curved slit. The filament is attached to the anther at the base of the latter, when the anther is said to be *basifixed*, or it may be attached at the back, when it is *dorsifixed*, or *versatile*, and moves freely on its pivot. There is a large or small gland on the back of the anther.

Fruits or Seeds.

After pollination and fertilisation the stamens wither or fall off, and the calyx-tube undergoes some modification to form the fruit—popularly called the "gum-nut." This contains the capsule which in turn contains the seeds. The space at the top between the place occupied by the stamens and the edge of the capsule is termed the "disc," and this varies considerably in the different species, being sometimes flat as in the Tuart, domed, as in the Bullich, or it may extend vertically down to the capsule lining the calyx-tube, as in the Karri, or the Yorrel and Morrel. The seeds vary considerably both in size and in shape; often they are minute, but sometimes as in the Marri and the Red-Flowered Gum, for example, they are large, and sometimes winged.

In addition to the fertile seeds, usually found in the lower part of the capsule, there are a number of sterile seeds, differing considerably from the fertile seeds and usually narrow. These form what is called the "packing" in the upper part of the capsule, and are the first to be shed when the capsule opens its valves.

The shape of the seed-leaves—those embryonic leaves which are the first to expand when the seed germinates—is of importance in respect to the relation-

ships of species. There are two main types: the broad cotyledons of the Jarrah and Marri, for example, and the Y-shaped or forked cotyledons of the Mallets and a large number of the inland trees and mallees.

Trees and Shrubs.

The *Eucalyptus* species can be conveniently classified according to their growth form into trees and shrubs, the latter branching at or near the base, and without any distinct trunk. Of the shrubby forms we recognise *mallees* and *marlocks*; the former with a subterranean somewhat bulbous stock capable of putting forth new stems at intervals (as for example after bushfires) and repeating this performance indefinitely, in some cases for over a century. Those shrubby forms which do not possess a bulbous base are termed marlocks, examples being *Eucalyptus macrocarpa*, and many others. Sometimes, however, a mallee may be a marlock, and sometimes some of the inland trees may become mallees under certain conditions, as for example injury to the trunk from termites, or from bushfires.

In Western Australia we use the term gum-tree in a very wide sense. In the Eastern States, especially in Queensland and New South Wales, and also in the Kimberley district of Western Australia such terms as "gum," "box," "stringy-bark," "messmate," "half-box," etc., are in common use. The "gum tree" properly is a tree like a Karri, that is, with a perfectly smooth bark, of which the outermost layers are shed annually. The Marri or Redgum is really a bloodwood, a tree with a friable rough bark, and usually kino or resin in the wood or bark; the Tuart is a "box tree", and the York-gum a half-box, i.e., it has a rough or "box" bark on the trunk, the branches being smooth. These terms will be explained under the various trees discussed.

JARRAH

(Eucalyptus marginata Sm.)

This tree, the principal timber tree of Western Australia occurs in South-Western Australia, and its boundary inland is determined by the winter isohyet of 30 inches.

It thus extends as far inland as Mooliabeenie, Clackline, Narrogin, thence west of the Great Southern Railway, to extend eastwards again in the vicinity of Tenterden, and embracing the Stirling Range, finally terminating near the Warriup Hills. Its northern limits are on Mount Peron, near Jurien Bay. It is typically associated with the ironstone soils of the Darling Range in the northern portion of its range, and indeed, it is found everywhere within its area of distribution where ironstone is present. In addition it grows in the sandy soils of the coastal plain between Gingin and southwards to the Albany district.

It is a stringybark, i.e., it has a fibrous, stringy, longitudinally-fissured bark which is strong. The timber is a deep red, and on this account it earned for the tree the early name of "Swan River mahogany." In certain places mallee forms are to be observed, particularly on the southern slopes of Mount Lesueur, and on the slopes of the Stirling Range. Otherwise, it is a tree, and the largest forms are to be found in the southern parts of its range as a forest tree attaining a height of 135 feet.

VALUABLE TIMBER

Jarrah timber has long been a popular article of commerce. It is hard, dense and easily worked and has a high degree of resistance to attacks of fungi and termites.

Prior to the development of concrete and asphalt road surfaces, many famous thoroughfares throughout the world were paved with Jarrah blocks, and its

Typical Jarrah Forest

NOTE FIBROUS BARK

durability has led to its extensive use as railway sleepers.

Used as a general purpose timber in this State, owing to our lack of indigenous softwoods, Jarrah is highly regarded in other States and countries where it is favoured for cabinet making, panelling and ornamental woodwork. The possession of a Jarrah-floored house is a matter for pride in other countries and of late years there has been an increasing overseas demand for Jarrah flooring boards.

Jarrah is not highly regarded as a honey-yielding tree. It would appear that very little nectar is available in the Jarrah forests but the coastal stands yield fairly large quantities of a somewhat dark-coloured and strongly-flavoured honey. This honey is more suitable for blending than for use in its natural state.

DESCRIPTION OF PLANT

The leaves are alternate, stalked, and narrowly lance-shaped, somewhat dull green above and paler underneath, the midrib prominent, the lateral nerves spreading, and the intramarginal nerve extending within the leaf margin and distinct from this margin.

The flowers are arranged in umbels of from four to eight flowers on slender pedicels thickening gradually upwards into the calyx-tube. The calyx-tube is obconical (i.e., reversed-conical), and the operculum narrow-conical and acute and longer than the calyx-tube. The stamens are numerous, in a continuous series, with white filaments sharply kinked when in the bud; the anthers are heart-shaped, and the two slits are contiguous at the summit, making as it were one crescent-shaped slit. The attachment of the anther to the filament is close above the base, and there is a small gland at the top of the anther. The fruit is stalked (pedicellate) and more or less spherical, up to three-quarters of an inch in diameter, contracted at the top, with a narrow, usually flat, disc, and the valves of the capsule are enclosed. The seed-leaves are kidney-shaped and taper at their bases into the petiole.

KARRI

(Eucalyptus diversicolor F. Muell.)

The Karri tree is the largest, or more strictly the tallest tree of Western Australia, attaining a height of 250 feet. It is a true gum tree, having a smooth bark, the outer layer of which sheds annually in rather large thick plates. It received the name "diversicolor" because of the varying colours of the bark at the time of the year when the older bark is shed. At this time the new bark, a bright orange-yellow in colour, contrasts strongly with the newly exposed bark, while underneath the shedding plates, the bark is white. Karri bark is thick, rich in tannin, and yellow in fracture.

The heartwood is red, and closely resembles that of the Jarrah. Indeed the resemblance is so close that the two timbers are difficult to distinguish one from the other, and the bushman's test of a burning splinter (leaving a white ash for karri, and a black or grey ash for jarrah) is frequently employed to distinguish between them.

FOR LONG, STRONG BEAMS

Although it lacks the high degree of termite-resistance which has made Jarrah famous, Karri timber is a valuable hardwood for superstructural work.

It is slightly more dense than Jarrah and considerably stronger. Its strength and rigidity and the extraordinarily long clean lengths which may be obtained have earned it the title of "The Beam Timber."

It is widely used for flooring and in recent years, "peeler logs" of Karri have been sliced for veneers and plywood.

1. JARRAH (Eucalytus marginata Sm.). A—Flowering twig; A1—Leaf-venation; B—Fruiting umbrel; C.—Fruits; D—Section through fruit; E—Anthers; F—Seedling, showing expanded cotyledons.

2. KARRI (Eucalyptus diversicolor F. Muell). A—Leaf; B—Umbel showing buds; C—Umbel of fruits; D—Longitudinal section of fruit; E—Anthers; F—Seedling showing expanded cotyledons and two subsequent pairs of young leaves.

Karri honey is a high-grade product widely recognised as the best honey produced in this State. It is a light-coloured clear honey with a delicate flavour and excellent consistency and the Karri forests usually contribute about 25 per cent. of all the table honey produced in Western Australia.

The main honey flows occur about every four or five years and records show that an extra heavy flow occurs about every 15 years. Averages of five cwt. of excellent honey per hive are fairly common during these heavy flow periods.

DESCRIPTION OF PLANT

The leaves of the Karri are alternate and petiolate, rather broadly lanceolate, dark green above and paler underneath, and more spreading than pendulous—an unusual character in South-Western Australian trees.

The lateral nerves are fine, spread at a rather wide angle from the midrib, and the intramarginal nerve is removed from the leaf margin. The umbels consist of from three to six flowers arranged at the summit of a terete (round in section) or compressed peduncle, and the flowers are pedicellate.

The calyx-tube is narrow—almost cylindrical—and tapers gradually at the base into the pedicel. The operculum is almost hemispherical or shortly and broadly ovoid-conical, much shorter than the calyx-tube. The numerous stamens are in a continuous ring, the white filaments being inflected inwards when in the bud.

The anthers are almost oblong in outline and attached near the middle of the back (dorsal insertion), and open in distinct parallel longitudinal slits, and there is a large dorsal gland.

The fruit is pear-shaped (pyriform) and contracted at the summit, slightly more than half an inch in diameter, with a narrow rim. The capsule is deeply enclosed within the fruiting calyx and the valves are also included. The cotyledons (seed-leaves), upon expansion after germination, are broadly kidney-shaped and taper into short stalks. The foliage of the young leaves is broad and delicate, and persists on the young trees until they are many feet in height.

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HERE'S THE Answer!

Some readers' questions, with answers supplied by officers of appropriate branches of the Department of Agriculture

ITCH MITE ON SHEEP

Some of my sheep are constantly biting themselves and rubbing against fences and other objects. Naturally I suspected the presence of lice but careful examinations failed to reveal any of these parasites and I fear that the trouble may be due to Itch Mite. Would a gammexane dip be effective?

From the description of the skin irritation and in view of the absence of lice it is very probable that your sheep have become infested with itch mite. Gammexane dips have not proved highly effective against this tiny parasite and dipping in a lime sulphur preparation is the best method of control. Full details of this treatment are given in leaflet No. 950 which may be obtained free of charge on application to the Department of Agriculture.

SANDED HORSES

Our horses are suffering from the effects of sand which is causing severe colic and a lot of pain and distress. Fairly large quantities of sand have been washed from the droppings so we think that this is the cause of the trouble.

Honey is commonly recommended for the cure of sand accumulations in the bowel and it is suggested that you give each horse up to 2 lb. of honey either in a bran mash or mixed with milk and given as a drench. This treatment may be repeated at frequent intervals and usually proves effective in bringing about the evacuation of the sand.

SCOURS IN CALVES

Last year we lost four calves owing to blood scours and would welcome some advice on a suitable treatment for this complaint. The animals became very dopey and showed loss of appetite and were passing blood within a few days. We tried dosing one of the calves with Sulphaguanidine but it did not appear to give a good result.

Sulphaguanidine is usually quite effective in the treatment of this complaint and may be worth further trials. As an alternative treatment, however, we suggest the following:—

(1) Give a dose of 4 oz. of castor oil.

(2) Starve the animal for 24 hours, allowing only cooled boiled water during this period.

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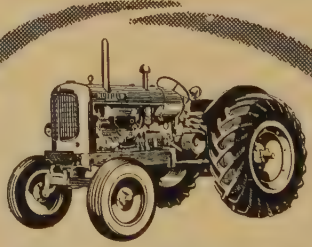

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(3) Dose the calf with the following mixture once daily:—
Bismuth carbonate—1 drachm.
Brilliant green—½ grain.
Lime water—2 fluid oz.
Water—4 fluid oz.

(4) After starvation allow the calf small feeds of whole milk and boiled water or lime water giving a pint on the first day and gradually increasing the quantity and strength of the mixture as the condition of the animal improves.

CAPE LILAC

I have a Cape Lilac tree growing near the house and am anxious to know whether the berries are poisonous to to stock.

The fruits or berries of Cape Lilac have frequently been reported as being poisonous to various types of farm livestock but appear to be most toxic to pigs. Although reports from overseas and other States suggest that cattle, sheep and poultry may be killed by ingestion of the berries, such cases are extremely rare and it may be noted that this tree has been planted freely on many large poultry farms in the metropolitan area and that no losses from poisoning have been reported to this Department.

SHEEP WITH SCABBY MOUTHS

Several sheep in my flock have sores round the mouth and in some cases on their feet causing slight lameness. Is there any cure for this trouble?

The ailment from which your sheep are suffering is probably what is known as contagious pustular dermatitis for which "scabby mouth" is the popular term. The condition is caused by a virus and is highly infectious often affecting a large proportion of a flock. It results in the development of sores round the mouth which become covered by thick scabs. In some cases the eruption extends to the feet while in the case of infected lambs sucking from mothers the sores may appear on the udders of the ewes. The disease should be dealt with in the following manner:—

(1) If practicable isolate the affected sheep.

(2) Remove the scabs by bathing with a warm solution of Lysol (1 oz. in 5 pints of water) and follow this by dressing with an ointment composed of cresol 5 parts, sulphur 10 parts, vaseline 100 parts. Repeat this treatment three to four times weekly.

In a mild case a fairly rapid recovery will usually occur but in severe cases, in which there is evidence of ulceration after the scabs have been removed, the parts should be dressed with tincture of iodine followed by dusting with equal parts of zinc oxide and boric acid.

Paddocks which have been occupied by an infected flock should be left vacant until they have been cultivated. Shearing sheds should be thoroughly sprayed with a five per cent. solution of Lysol.

"BOTTLE JAW"

A few weaners in my flock have soft flabby swellings under their jaws resembling goitres and I was wondering if this could be the complaint known as "Bottle Jaw." If so what would be the cause and how can the condition be remedied? A few of the older sheep have some ailment which causes them to become very weak and staggery after being driven for a short distance. Their legs appeared to fail them and they lay panting and exhausted but if left undisturbed for a time they usually recover.

The symptoms of Bottle Jaw which you have described and the weakness which you have observed in the older sheep are typical of infestations with the large stomach worm *(Haemonchus contortus)*.

Sheep harbouring these parasites become unthrifty, lose condition and show extreme paleness of the skin and visible mucous membranes such as those of the mouth and surrounding the eyes. This is due to anaemia caused by the heavy demands made upon the system by the parasites. In some animals there is an increase in the size of the abdomen, giving rise to the familiar system of "pot-belly."

For the treatment of flocks infested with stomach worms, drenching with phenothiazine is recommended. This drug is sold under a variety of trade names such as "Phenovis", "Phenzeen" and "Phenovine", and is available from all stock agents. The dosage and the method of administration are given on the container.

It would be advisable to dose the whole of your sheep immediately with this preparation and to repeat the treatment after an interval of three or four weeks. In addition the grazing should be supplemented with wheat or oats at the rate of ½ to ¾ of a pound per head daily.

CHEMICAL CAPONISING

Can you explain the principles involved in chemical caponising and give some details of the operation? What equipment is required and what is the approximate cost?

The sexual processes of the body are governed by hormones which may be briefly described as chemical substances secreted by the sex glands—by the testes in the male and the ovaries in the female.

Cockerels which have been caponised by surgical removal of the sex glands, lose their pugnacious disposition and the activity normally associated with the male birds. They fatten more readily and the flesh retains a delicate flavour and texture instead of becoming tough and "staggy" as the bird grows older.

These are two 22-week old cockerels. The bird on the right was chemically caponised by the implanting of a stilboestrol pellet as described in this article. The operation was carried out in the 16th week. Note the feminine appearance and failure to develop the typical comb and wattles.

Chemists have succeeded in producing synthetic hormones such as stilboestrol which resembles the female sex hormone and if this is administered to a male bird it "blankets" the male sex hormones secreted by the testes and gives similar results to the removal of the male sex glands.

The operation of chemically caponising cockerels involves the implantation of a stilboestrel pellet high up in the neck of the bird. The implantation is usually carried out six to eight weeks

before the birds are ready for market. From experiments carried out by this Department last year, it would appear that the most satisfactory time to caponise by this method is when the birds are 12 weeks of age. The birds can then be marketed when they are five months of age. Should you wish to keep the cockerels for a longer period, it would be necessary to treat them at intervals of six to eight weeks from the time of the first implantation. There is sufficient stilboestrol in each pellet to desex the bird for about eight weeks. At the end of that time the cockerel regains its male characteristics.

The operation is carried out by implanting a pellet which contains 15 milligrams of stilboestrol with the aid of a metal injector. The injector consists of a hollow needle with a bore just large enough to take the pellet, and a plunger for injecting the pellet into the neck.

The pellet is placed in the tube of the injector, and the skin behind the back of the head is pierced with the needle. The tip of the needle is directed towards the head, and is allowed to slide along just under the skin for about three-quarters of an inch. The plunger is then pushed home, and the pellet lodges in the neck of the bird. The injector should be twisted as it is withdrawn, in order to ensure that the pellet leaves the needle.

Stilboestrol pellets together with an injector may be purchased at a cost of about 23s. 6d. for a carton of 100 pellets and 14s. for the injector.

BLOOD-STAINED EGGS

Recently a few of the eggs laid by our fowls have the white portions discoloured by what appears to be blood. What would be the cause of this trouble?

It is quite possible that the discolouration is caused by an infusion of blood throughout the white of the egg. This condition is not unusual and may have been caused by the rupture of a small blood vessel during the formation of the egg. Such conditions are usually only associated with individual hens and in most cases the trouble clears up within a short period.

RABBITS FOR POULTRY

I am feeding my chickens in accordance with Table 10 of your article "Nutritional Requirements of the Domestic Fowl" but I find that my ration of meatmeal is not sufficient now that the birds have grown bigger. However I can procure quantities of rabbits and I wish to know if cooked rabbit would be a suitable substitute for meatmeal and whether it would be possible to feed them too much meat of this kind.

As fresh meat only contains about 16 per cent. protein we do not think that there is any danger in feeding the birds all the rabbits that they can eat, and you could safely feed quantities of rabbits in addition to whatever meatmeal was available.

BROODY HENS

I have 12 Australorp hens which are kept to supply the household with eggs. The birds seem to go broody at fairly frequent intervals and this interferes with egg production. What do you recommend as the most satisfactory method of getting the birds over the broody period?

We suggest that you make a broody coop which should be in the form of a crate 2ft. wide 2ft. deep and at least 2ft. in length. It should stand on legs so that it is 2ft. or 3ft. above the ground and the bottom of the coop should be made of 2in. or 3in. slats placed about 1½in. apart so that the birds are compelled to perch instead of sitting. The

front of the coop should be slatted also with slats about 2½in. apart to enable the birds to eat and drink from troughs placed along the front of the coop.

"Broodies" should be removed from the nest as soon as they are noticed and should be confined to the coop for five days. At the end of this period the birds may be returned to the flock and should recommence laying in eight days, making the total of 13 days out of production. If the birds are allowed to remain on the nest when they go broody several weeks' production may be lost.

WHALEMEAL

Would the feeding of whalemeal to poultry have any advantages over feeding them meatmeal in the mash?

Whalemeal is an excellent foodstuff for poultry and is equal in feeding value to the best grades of meatmeal available in the local market. The whalemeal should be fed at the same level as meatmeal which contains 50 per cent. of protein.

DUCKLINGS NEED VITAMIN A

My Indian-Runner duck recently brought out 11 ducklings which appeared healthy until they were approximately three weeks old. Since then, over a period of about a month I have lost eight ducklings which showed the following symptoms. They appeared to be gasping for breath and developed a slight staggering gait. They showed a disinclination to drink but if forced to swallow went into convulsions and died in a matter of seconds. If left undisturbed they died within a few hours. I would appreciate any advice as to the cause and cure of this disease.

Without an examination it is difficult to diagnose the condition affecting your ducklings. The symptoms suggest, however, that they may be suffering from Vitamin A deficiency brought about by a shortage of green feed or the feeding of greenstuff of poor quality.

Ducklings up to three weeks of age do not consume sufficient greenstuff to supply their Vitamin A needs and it is recommended that a vitamin rich supplement should be fed. The most popular and convenient method of increasing the Vitamin A intake is to feed fish oils with the mash. These oils are available in proprietary form under such names as "Vetemul", "Ovadol" and "Vita-Oil A". Details of the quantities to be administered are supplied by the manufacturers in each case. Leaflet 1057 has been forwarded to you and notes on Vitamin A deficiency appear on pages 41 and 42.

HAVE YOU A PROBLEM?

THE Department of Agriculture is always at your service as the source of expert advice on all phases of the farming industry. This advice is free, and officers of the Department are available to assist in solving your individual problems. Whether you are a wheat and sheep man, an orchardist, a market-gardener, a poultry farmer, dairyman or beekeeper—whatever form of farming activity you favour—expert advisers are here to help you.

Do not make personal calls however, unless the matter is extremely urgent. Write, giving the fullest possible particulars, to the Director, Department of Agriculture, St. George's Terrace, Perth.

Some Reviews of Current Publications of Rural Interest

FREAM'S "ELEMENTS OF AGRICULTURE"

WHEN a book can maintain its popularity over a period of nearly 60 years and run into 13 editions—quite apart from many reprints of the individual editions—there seems to be little need for a reviewer to enlarge upon its good qualities. That I venture to do so may be attributed to the fact that the book was written as a guide to British agriculturists and is not as well-known as it deserves to be here in Australia.

Fream's "Elements of Agriculture," the thirteenth edition of which is now on sale at Perth bookshops, made its debut in 1892 and was edited by the late Dr. William Fream. For some 40 years it remained almost unchallenged as a standard textbook on agriculture, but in 1932, its twelfth edition was revised and brought up-to-date by the staff of the Cambridge School of Agriculture. In 1945, the Royal Agricultural Society of England decided that the book should again be revised to provide for the need of post-war agriculture and the production of a thirteenth edition was entrusted to Dr. D. H. Robinson. With the backing of such a powerful body as the R.A.S.E., Dr. Robinson was able to enlist the aid of many outstanding authorities in compiling this very readable and highly comprehensive volume.

Agriculture is not a single subject, but a vast and complex series of separate studies all inter-related to a greater or lesser degree, so the scope of the book had to be exceedingly wide. Commencing with the soil itself—its formation, composition and physical properties—the authors pass on to a brief discussion on the part played by soils in plant nutrition. In logical sequence follow articles on field drainage, tillage and farm machinery, with special emphasis on the use of mechanical power.

Plans for farm buildings, a treatise on manures and manuring, notes on the growing of various crops, pasture establishment and management are mainly written for British conditions, but provide a valuable source of basic information which has a world-wide application in many cases.

The chapters dealing with livestock are particularly attractive. Condensed histories of the many breeds of horses, cattle, sheep and pigs which have earned for Britain the title of "The Stud Farm of the World" are supported by a number of excellent half-tone illustrations which are well-printed on excellent paper.

Foods and feeding, animal hygiene, an outline of veterinary physiology and articles on breeding and management give a mass of useful information in small space.

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SOLE AGENTS FOR W.A.

In a review of this nature it is impossible to enumerate all the subjects dealt with, as the book is a veritable farming encyclopedia and its 723 pages are crammed with useful information. There are 110 illustrations in the text with 55 pages of half-tone pictures and the book is attractively bound in full cloth and printed in clear type on good paper.

It would be an ideal gift for a student at an agricultural college or for a farmer desirous of gaining an all-round general knowledge of agricultural science.—J.M.

(Fream's "Elements of Agriculture," published by John Murray, London. Price, 35s. 6d. at Perth booksellers.)

GENETICS MADE EASY

DR. A. L. HAGEDOORN, a Dutch geneticist, whose books on animal and plant breeding have brought him international renown, paid a visit to Australia in 1949, largely as the result of negotiations instituted in this State by Mr. E. H. B. Lefroy, of Cranmore Park, Walebing.

During his Australian tour, Dr. Hagedoorn, addressed 80 meetings of farmers and stock breeders, broadcast extensively over the A.B.C. network and wrote a number of special articles for Australian newspapers.

An acknowledged authority on genetics, he possesses the happy knack of being able to explain his theories in layman's language, often enlivened with stories of interesting personal experience and spiced with dry humour. Wide practical experience in breeding many different species of animals in a variety of environments enables him to meet stock-breeders on common grounds.

During his tour, Dr. Hagedoorn encouraged interested listeners to ask questions which he answered on the spot. Dr. G. L. Sutton, former Director of Agriculture in Western Australia, was entrusted with the task of preparing a booklet recording the main points of Dr. Hagedoorn's address, together with a selection of the questions asked him and the answers given. This book is now on sale at Perth book shops. Although Dr. Hagedorn himself stresses the fact that the present publication has no pretensions to being a complete and rounded-off handbook for animal breeders, it nevertheless serves as a useful primer to the beginner in the study of genetics and outlines the principles advocated by Dr. Hagedoorn under such heading as Progeny Testing; Nucleus Breeding Schemes; The Value of First Crosses and Hybrid Vigour; Inbreeding; Variation and its Causes; Artificial Insemination; The Agricultural Show; Breeders' Fancies—Ancient and Modern; Laying Test Reform, and Testing Stations for Pigs. The result is an 80-page booklet under the title of "A Geneticist Talks with Australia Animal Breeders," in which he strongly advocates the use progeny testing and inbreeding combined with selection as the means of raising the average quality of stock in a relatively short time. He urges Australians to heed three main principles:—

> Animals bred for economic purposes must be judged solely by economic standards.
>
> The excellent appearance of a show animal is not in itself a guide to its value for breeding.
>
> The object in breeding domestic animals is not to produce only a few good ones, but to produce large groups of animals that are all good.

This unpretentious little paper-backed volume is produced by the Commonwealth Scientific and Industrial Research Organisation. It is attractively presented on excellent paper and is surprisingly good value for the money. Stock breeders and others will find it easy to read and chock-full of interesting information presented in a friendly conversational manner.—J.M.

("A Geneticist Talks with Australian Animal Breeders" by A. L. Hagedoorn. Our copy from Albert's Bookshop, Perth. Price, 5s.)

CLIMATE AND HOUSE DESIGN

THE choice of materials for building a house is usually influenced by availability and first cost. Little thought is given to the effect of this choice on the comfort of the ocupants. Evidence of this is to be found in the widespread adoption of 11in. brick cavity walls and timber framed walls carrying lightweight sheeting throughout Australia, despite large differences in climatic conditions and the very different "thermal behaviours" of these two extreme construction types.

In the past there has been a lack of reliable information as to the influence of different forms of construction on the relationship between outside climate and indoor environment. The urgent need for such information becomes readily apparent when considering the question of designing buildings to be occupied by white people in the tropical and subtropical areas of Australia. Without an understanding of the factors involved it is not possible to adapt standards for temperate climates to meet the needs in areas experiencing hot summers.

For several years the Commonwealth Experimental Building Station has been conducting a planned investigation into this subject and has now published a review of its findings. It is found that there is some opportunity in the hot arid and the temperate climatic zones to control temperatures indoors by the selective use of building materials.

Work done so far on the physiological aspects of the problem points to 85° F. as being the maximum indoor temperature which can be sustained with tolerable comfort by persons seated or nominally at rest. On the basis that this temperature should not be exceeded on a hot day the station has provided climatic data for capital cities and some principal towns, together with a Thermal Behaviour Chart from which it is possible to assess the desirable weight of construction for a locality with a known range of shade temperatures.

This information is included in the Station's Technical Study 34, entitled "The Thermal Behaviour of Dwellings," by J. W. Drysdale, B.E., A.M.I.E. Aust. A concise review of the station's experimental work gives particulars of the Test Hut and Model Techniques developed for examining different types of construction in an economical manner. Interesting observations arising from the tests concern the effects on indoor temperature of the insulation of walls and roof and the shading of sunlit walls. The popular belief that a galvanised iron roof causes a house to be hotter than it would be if sheeted with asbestos cement or if roofed with clay tiles is not supported by the station's tests.

Copies of Technical Study 34 may be obtained for 2s. each from the station, Box 30, Chatswood, New South Wales, or from Building Research Liaison Service, Box 2807AA, Melbourne.

NEW C.S.I.R.O. PUBLICATION

THE proceedings of a Specialist Conference in Agriculture "Plant and Animal Nutrition in Relation to Soil and Climatic Factors: Australia 1949," have now been published by His Majesty's Stationery Office (London). This is an extremely valuable compendium of information on plant and animal nutrition in relation to soil and climatic factors and comprises original papers contributed by leading experts in this field from all parts of the British Commonwealth.

Copies may be obtained from C.S.I.R.O., 314 Albert Street, East Melbourne, C.2., at 25s. each. Postal notes, money orders, and cheques should be made payable to "The Collector of Public Moneys, C.S.I.R.O.," at the above address.

UNDERGROUND WATER

TO those interested in the utilisation of the vast quantities of water stored underground in Australia, a new 76-page book "Underground Water in Australia," will provide much valuable information.

In eight chapters the author, Dr. L. Keith Ward, formerly Government Geo-

logist of South Australia, presents, with the aid of many large illustrations, the story of the origin of underground water, its various forms of storage, and where it exists. Dr. Ward writes in detail about the Great Australian Artesian Basin, its geological formations, earth movements, temperature and pressure, intakes and outlets and the chemical character of the water. Similar treatment is given to the Murray River and Eucla artesian basins.

Of special interest to persons using underground water is Dr. Ward's chapter on the composition, testing and utilisation of underground water. In this chapter, he writes of the estimation of salinity, determination of hardness, avoidance of pollution, fluorine in underground water, significance of salinity in utilisation, and the use of the water for human consumption, stock, irrigation, industrial and engineering purposes.

Dr. Ward discusses the contentious question of water divining. He says "No proof has been afforded that will satisfy scientific investigators that the dipping of a rod, the swivelling of radiations that can be detected by physical instruments and correlated with the water bearing properties of rocks."

("Underground Water in Australia" is published by the Tait Publishing Company Pty. Ltd., 349 Collins Street, Melbourne. Price, 12s. 6d., plus 7d. postage.)

FODDER TREES

HISTORY records that back in 1750 or thereabouts, one Mathieu Tillet, who was Master of the Mint at Troyes, in France, managed to find relief from the strain of his official duties in running a small farm. Besides being an enthusiastic farmer and gardener he was a keen research worker and carried out a number of agricultural experiments, some of which paved the way for the control of bunt in wheat.

Here in Perth, a former Deputy Master of the Royal Mint, Major H. A. Corbet, has long enjoyed a reputation as a well-informed horticulturist. As a writer and broadcaster on gardening subjects he has helped many home gardeners with their problems. Major Corbet is the author of a recently published pamphlet entitled "Fodder Trees," in which he has reviewed many species of trees which have value as "top-feed" in the pastoral areas of Australia.

Emphasising the importance of top-feed as a means of carrying our sheep flocks through drought periods, Major Corbet makes a plea for a comprehensive survey of these useful species with a view to utilising them to the best advantage. He points out that all too frequently these native fodder plants have been treated as a wasting asset to be exploited until exhausted and already overstocking, bushfires and droughts have led to their virtual extinction over wide areas.

He suggests that a programme of research work should pay good dividends in ascertaining the best strains and possibly evolving new strains or varieties. He points out that in many cases these fodder trees are legumes which improve the soil by the addition of atmospheric nitrogen and that, as many of them are deep-rooting, they bring needed elements from the lower levels to improve the surface soil.

He feels that there is scope for much research work into the establishment of these fodder trees and their maintenance in such a manner that they would provide a useful insurance against starvation during drought periods. The regeneration of eaten-out areas, the use of fodder trees in shade and shelter belts and the collection and distribution of seeds are all worthy of fuller investigation.

Major Corbet has listed a number of the better known fodder trees, including the mulga and other acacias, some of the salt bushes, kurrajongs, casuarinas, in addition to trees which produce pods and beans of considerable nutritive value such as the carob bean, honey locust and the mesquite or algaroba.

A revised edition of this little booklet has been printed and published by the Imperial Printing Co. Pty. Ltd., Perth, and its cost is 1s. 9d. post free.—J.M.

The Commonwealth Bank offers the most comprehensive range of trading bank services available in Australia. Such services include cheque accounts, finance for primary production and other facilities helpful to the man on the land.

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Kimberley Soils Need Phosphates

By W. M. NUNN, B.Sc. (Agric.)
Officer-in-Charge, North-West Branch

RESEARCH work carried out at the Kimberley Research Station on the Ord River, and on experimental plots throughout the East and West Kimberleys, indicates that the soils of the Kimberleys are quite as deficient in phosphorus as are the soils of our agricultural areas where superphosphate is essential to the growth of most crops.

This may come as a surprise to many people, for there has been a widespread tendency to assume that the Kimberleys soils, especially those of the Ord and Fitzroy valleys, are highly fertile.

The black earths of Queensland's Darling Downs produce most enviable yields of sorghum without superphosphate and seem to be able to go on doing it year after year. Perhaps because patches of our Kimberleys are said to resemble these rich basaltic soils of Queensland—perhaps because in a good wet season the growth of grasses is so impressive—or perhaps merely because the Kimberleys are so far away, there seems to have arisen a belief that superphosphate would not be needed to grow crops in those areas.

Although we have not yet progressed very far with agricultural research in the Kimberleys, the work done to date points very definitely to a phosphorus deficiency in both plants and animals.

An extensive soil survey was made of a section of the Ord River valley by Mr. G. H. Burvill, now Commissioner of Soil Conservation, prior to the establishment of the Kimberley Research Station on its present site. Soil analyses then, suggested a probable phosphorus requirement but left us hoping that such requirement would be light compared with present wheatbelt usage. We know now, after four years of experiments, that all crops need superphosphate on that soil and that they need it in large amounts.

Where soils are short of phosphates it is to be expected that plants growing on them will be below normal in phosphorus content. Quite a number of analyses have been made of pasture samples taken from various soil types, again mostly in the Ord River region, and have consistently shown low phosphorus figures.

Even in the early stages of growth many of the native species show low phosphorus. In the later stages they are very low indeed, and when you remember that the cattle have green picking for only a few weeks after the rains and live on dry grass for the rest of the year, it is fairly obvious that they too, must be lacking in phosphorus.

BLOOD SAMPLES TAKEN

Dr. L. C. Snook, our Animal Nutrition Officer, has drawn attention to the need for phosphorus in the diet of cattle. On several visits to the Kimberleys he has

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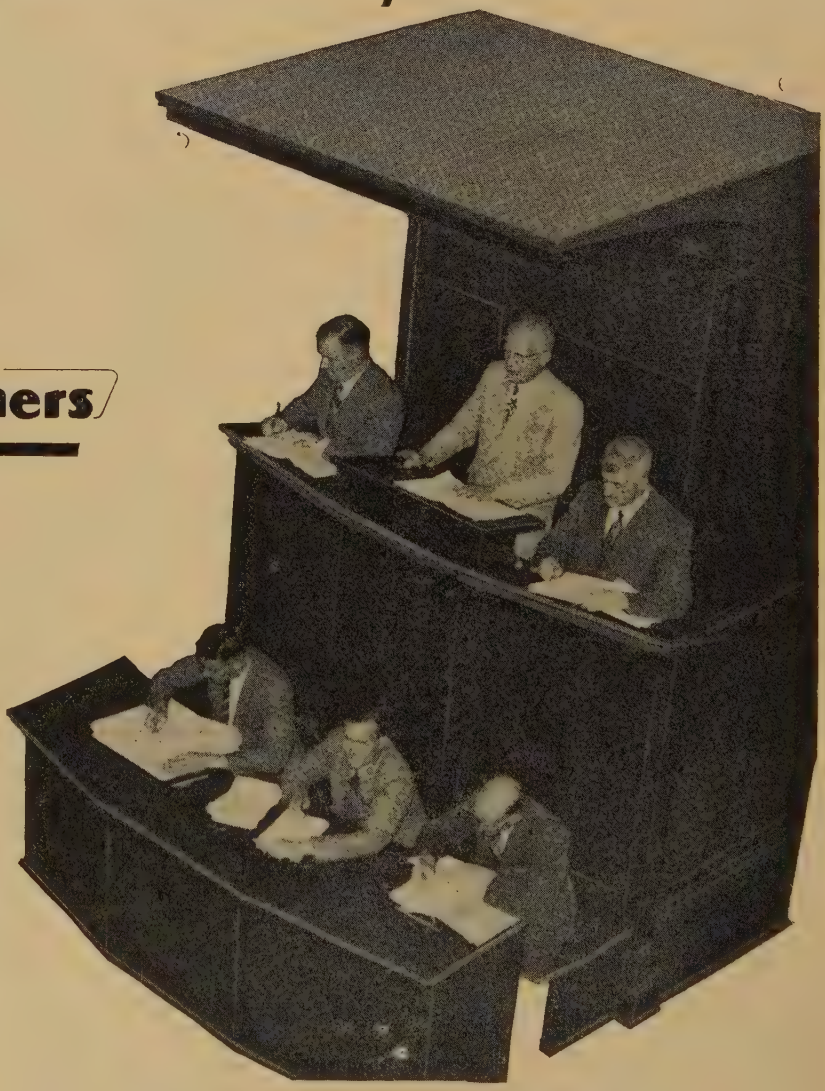

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Cattle en route for Wyndham

been to some trouble to collect blood samples whenever opportunity occurred. Such opportunities have, unfortunately, been far too few to give a reliable cross-section of such a large area and most of them have dealt with bullocks on their way to slaughter. It is in milking cows that such a deficiency shows up, and it is noteworthy that in the few instances where such animals were tested, the phosphorus figures were very low indeed.

With the critical outlook of one trained in the faculty of science, I have frequently played the role of disbeliever when a cattleman has pointed out a stiff-legged animal and remarked that

Typical country in Ord River Valley

it needed phosphorus. We sceptics want more proof than that and we are looking for it.

However, with soil, pasture and blood tests all giving the indications they do, I now feel when I see a fat healthy calf on a bony "peg-legged" cow, that the odds are high in favour of a phosphorus deficiency.

The Kimberleys annual out-turn of cattle is about 10 per cent. of the number that are supposed to be there. If all was well, it ought to be 20 per cent. Perhaps they don't breed. Perhaps they do breed and the subsequent cow an calf mortality reduces the increase to this disappointing figure. We shall know the answers one day. In the meantime, it is a phosphorus-deficient area and a phosphorus supplement may help very materially.

Twin Bottle-trees in East Kimberley

NEED FOR SUPPLEMENTS

In South Africa, cattle in the veldt country have received a wonderful boost from the feeding of phosphatic supplements in the form of a lick composed of salt and bonemeal. In America they now supply phosphorus in the drinking water, and range cattle production is said to have benefited enormously.

In our own South-West, the feeding of a phosphorus supplement is becoming more and more general among dairy farmers. Here it is done either by adding superphosphate to the drinking water, or by damping the feed with a solution of superphosphate.

I can think of no set of conditions more likely to lead to a heavy phosphorus requirement than those applying in the Kimberleys with an almost round-the-year diet of dry grass, especially with the pointers given by soil, pasture and blood analyses.

Unfortunately, under the present system of range management, the correction of such a deficiency is going to be very difficult. Kimberley cattle run on unfenced million-acre leases. They are mustered once a year to enable beasts of marketable age and condition to be drafted off for the meatworks at Broome or Wyndham, or for the trip to Fremantle and subsequent slaughter at Midland Junction.

There is no possibility of placing a measured supplement in the feed or the trough, as for the dairy cow. A bulk lick might be made freely available at water points, but the odds are that steers and bullocks would enjoy it to the exclusion of the really needy milking cows.

AMERICAN TECHNIQUES

The one method that really does impress above all others, is the American mechanically-controlled system of adding phosphorus in solution, to the drinking water.

A saturated solution of monosodium phosphate is placed in a tank which is connected by a specially designed proportioner to the water pipe supplying the cattle trough. A ball tap controls the flow of water in the usual way and the passage of water through the pipe operates the proportioner which injects the requisite amount of solution into the stream. An exact dosage is, therefore, available to each animal as it takes its requirement of drinking water.

A portion of the stock route to Wyndham

Unfortunately, we have no monosodium phosphate in this country, which makes it harder, as monosodium phosphate is a very soluble form of phosphorus, particularly suitable for this purpose.

We have monocalcic phosphate, however. It is the water-soluble component of superphosphate and represents 18 per cent. of our commercial super. Perhaps we can adapt the machine to use this source of phosphorus.

Our cattle adviser, Mr. G. A. Smith, has been in touch with American workers over a number of years and recently with an American firm, concerning the possible supply of a few machines for experimental work in this State. If all goes well, he should have field trials under way next season, and I certainly wish him every success, because I am now convinced, as he has been for a long time, that a phosphorus supplement must mean a great deal to the Kimberley cattle industry if only we can discover an economical way of feeding it.

(Adapted from a broadcast script made available by courtesy of the Australian Broadcasting Commission.)

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•

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ROCK MELONS are Popular

By H. M. GLOSTER
(Domestic Science Branch, Education Department)

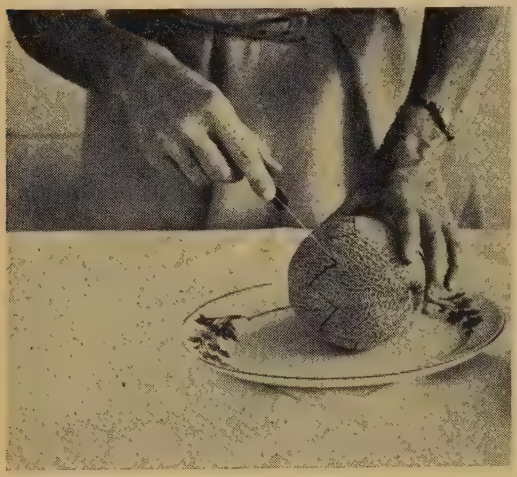
MOST Australians know and appreciate the rock melon or musk melon, which provides a popular and appetising addition to the menu during the summer months. This small melon, of which several varieties are grown in Western Australia, possesses an aromatic odour and flavour and is believed to have originated in Armenia many centuries ago. It is a popular dessert dish in America where it is known as the cantaloup, a name derived from Cantalupo, a former country seat of the Pope, near Rome. It was here that the rock melon was cultivated and improved many years ago.

September and October are the best times to sow rock melon seed in order to ensure a good supply of fruit during January-April period. It takes about four months from the time of sowing until the fruit matures. For good results liberal quantities of animal manure and adequate water and sunshine are necessary.

Food Values.

Apart from its succulence and pleasing flavour the rock melon has considerable value as a food and is worthy of a great deal more attention in this respect than it has received hitherto. It is a rich source of carotene and vitamins and contains several important minerals. It supplies a cheap appetising and wholly adequate alternative to citrus fruits for three months of the year.

Vitamin A is essential for the proper functioning of the eyes and gives increased resistance against infections of the respiratory tract. A severe lack of Vitamin A causes night blindness and a partial lack is responsible for weakness and retarded growth. An important



Using a sharp knife, cut round the melon in a zig-zag line

source of this vitamin is butterfat, but unfortunately owing to the high price of butter many housewives are using cheaper substitute fats which may be deficient in Vitamin A. Rock melons contain supplies of carotene which the body can convert into Vitamin A.

A large slice of rock melon will provide as much Vitamin E as an average sized orange and sufficient carotene to supplement possible shortages of Vitamin A due to decreased consumption of butter.

Pull the two halves apart—

Vitamin E is essential in the diet and severe shortages will cause scurvy. A partial lack in the diet causes pains in the joints and limbs, poor teeth, bleeding gums and retarded growth. It is also recognised that a lack of Vitamin E will retard healing, and large dosages are now given in hospitals to speed up recovery after operations and accidents.

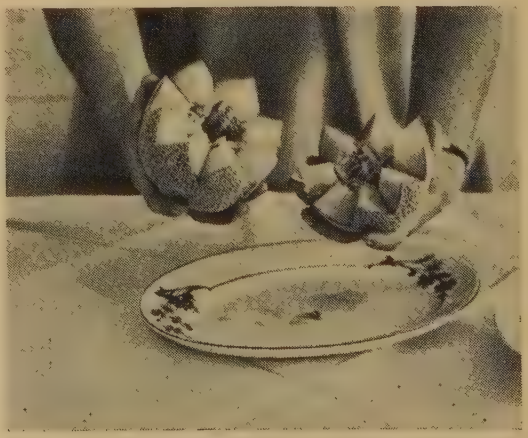
Hitherto, the housewife has depended largely on citrus fruits, potatoes, tomatoes and turnips and green vegetables for Vitamin E supplies. Rock melons can provide a cheap and pleasing alternative.

The vitamin content of food is lowered by storage or cooking. Freshly picked rock melons from the home garden have the highest food value, and a distinct advantage is that the rock melon is eaten in its raw state.

To Serve Rock Melon.

Rock melon may be served for breakfast or as a dessert after lunch or dinner.

It may be chilled by placing it in the ice-chest or by wrapping the fruit in a wet cloth and leaving it in a draught for some hours. Chilled fruit is most appetising in hot weather. Segments should have the seeds removed, then sprinkled with sugar before serving.



—and you have two attractively-shaped portions Now remove the seeds, and—

The most attractive way to serve rock melon at the table is to cut the fruit as illustrated then to pull the serrated halves apart. Seeds should be removed, then each half placed in a fruit dish. Segments may be cut off as required.

Rock Melon as a Dessert.

Chill rock melon and sprinkle with sugar. If served with ice cream this is delicious.

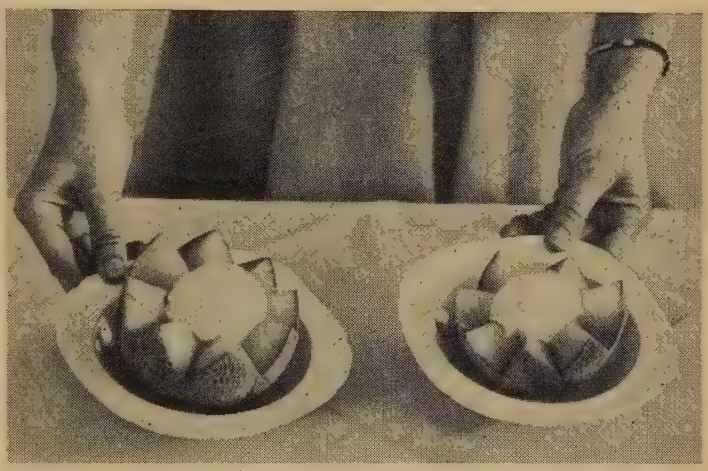
Fruit Salad.

Add rock melon to fruit salad. This gives more variety to flavour and increases the nutritive value.

Passion fruit pulp and sugar served with rock melon is a pleasing variation.

Fruit Cup.

Rock melon juice may be added to fruit cup either separatedly or in combination with other fruit juices.



—serve with ice-cream to give a dessert dish that is attractive to both the eye and the palate

Rock Melon Jam.

For the home gardener who has a surplus melon crop try this recipe.

Ingredients.

Six lb. rock melon.
Six lb. pie melon (firm part).
Six lb. sugar.
Juice of two medium-sized lemons.

Method.

1. Cut the fruit into dice, sprinkle with one lb. sugar and leave over-night; this draws the juices.
2. Cook slowly until soft and clear, about three hours.
3. Add sugar. Boil quickly until "jell" point is reached, about one hour.

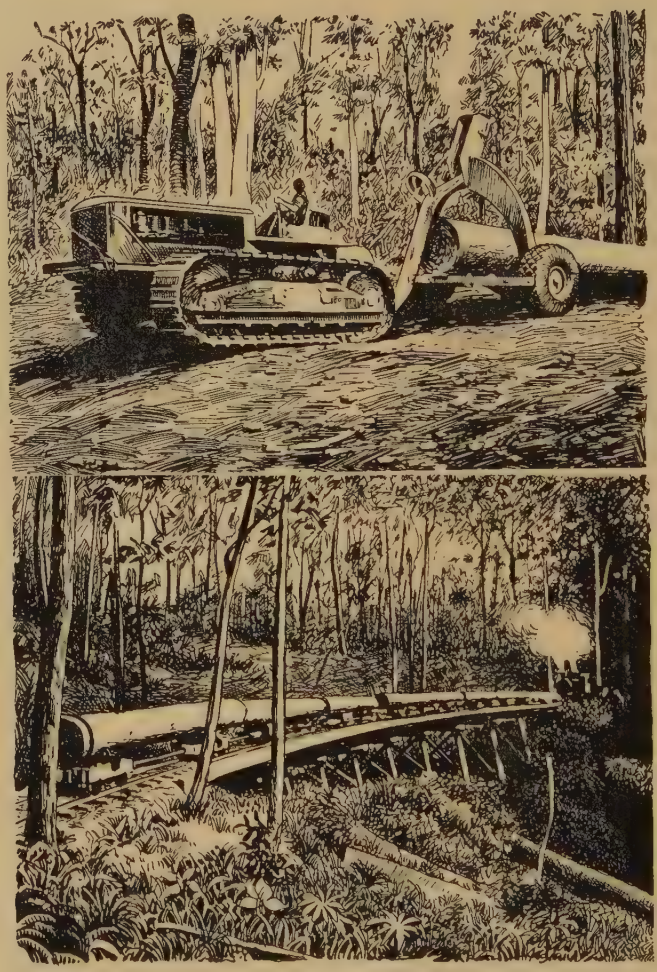
(N.B.—Lemon may be omitted, but the lemon improves the flavour and helps the jam to *set* or "jell.")

4. Bottle while hot.
5. Cover and label when cold.

BLOCK LETTERS, PLEASE

Long years of copy-reading have made the editorial staff reasonably skilful in deciphering bad handwriting, but we still have letters with unreadable signatures, carrying requests to be put on the mailing list. Block letters please for names and addresses, if you wish to be sure of getting on the list.

STATE SAW MILLS AND BRICK-WORKS



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MAKING USE OF BLACKBERRIES

Pest Plants Yield a Useful Harvest

By H. M. GLOSTER

(Domestic Science Branch, Education Department)

BLACKBERRIES will soon be ripe, and as the plant has reached pest proportions in many parts of the South-West there should be ample supplies of berries for conversion into jams and preserves.

In Europe where the blackberry or bramble grows wild in the hedgerows the plant is regarded with favour. Apart from the fact that this tangled growth makes the hedges more stockproof, the berry harvest provides pin-money for country children who find that the fruit has a ready sale. Blackberry jams and preserves are delicate in flavour and contain appreciable quantities of minerals and vitamins.

Early settlers, who cherished memories of flaky-crusted blackberry pies and richly-hued jars of blackberry jam and jelly, introduced the plants into Australia where they have spread and become a pest on large sections of valuable agricultural land. Some of the new hormone-like weedicides are proving effective in the control of this hardy plant, but in the meantime the blackberry thickets may yield a crop of berries to vary the farm menu. The following recipes may assist in their profitable utilisation.

Blackberry Jam

Ingredients.

Six lb. blackberries.
Four and a half lb. sugar.
Juice of one medium-sized lemon.
One cup water.

Method.

1. Pick and look over the berries carefully, discarding any that are over-ripe or unsound. If fruit has been sprayed wash well.
2. Put blackberries, lemon juice and water on to cook.
3. Boil gently until fruit is soft.
4. Add sugar, boil quickly until "jell" point is reached.
5. Bottle while hot.
6. Cover and label when cold.

Blackberry and Apple Marmalade

Ingredients.

Equal quantities of blackberries and apples (windfalls are quite satisfactory).
One lb. sugar to one lb. pulp.

Method.

1. Wash the apples and cut into slices without removing skins and cores.
2. Pick the blackberries over carefully, discarding any that are unsound.
3. Put fruit in a preserving pan with just sufficient water to prevent them from burning.
4. Boil slowly, until reduced to pulp, stir frequently.
5. Rub through a hair sieve removing skins and pips.
6. Return pulp to a clear pan, add sugar (pound for pound) and bring to boil.

7. Stir frequently and cook about 20 minutes or until thick.

8. Bottle while hot.

9. Cover and label when cold.

(N.B.—Apples should be "under-ripe.")

Blackberry Jelly

Ingredients.

Blackberries and sugar.

Method.

1. Prepare blackberries.

2. Put blackberries into a preserving pan and nearly cover with cold water.

3. Bring slowly to the boil and bruise well with wooden spoon.

4. Cook gently three-quarters to one hour until the juice is well out of fruit.

5. Strain through a jelly cloth.

6. Measure juice and return to a clean preserving pan.

7. Bring juice to the boil, boil for 15 minutes, then add sugar, allowing three-quarter lb. sugar to one pint juice.

8. Boil until "jell" point is reached.

9. Skim if necessary, bottle and cover as in foregoing recipes.

Bottled Blackberries

1. Make a syrup using half a cup of sugar to each cup of water.

2. Boil for 10 minutes, allow to cool.

3. Prepare fruit, then pack into preserving jars.

4. Fit rubbers to jars.

5. Fill jars to brim with syrup, avoid air bubbles. Put on lids and clips, if Fowler jars are used, or place screw caps on lightly.

To Sterilise.

The following method is quite satisfactory although any approved method will do.

1. Stand bottles in boiler or kerosene tin, placing slats of wood between bottles and base of container. The wood protects bottles from the heat of the stove.

2. Pour in cold water to reach three-quarters way up the bottles or completely cover. Do not allow bottles to touch. Cover saucepan or tin.

3. Bring water very **slowly** almost to simmering point. This takes about one hour.

4. Keep at this temperature 45 minutes.

5. Allow to cool **very slowly.**

(N.B.—If screw top jars are used, tighten lids as cooling commences. Test jars to see if they are airtight by turning upside down.)

Blackberries for Dessert

Blackberries may be used for pies, separately or with apples. This adds a pleasing variation to the dinner menu.

Stewed Blackberries

Blackberries, stewed either separately or with apples, make a delicious sweet and may be served either hot or cold, with junket, blanc mange, custard, cream or ice cream.

Preserved Blackberries

Ingredients.

Eight lb. blackberries.
Two lb. sugar.
Two pints water.
One teaspoon salicylic acid.

Method.

1. Boil sugar and water for 15 minutes, add fruit and cook gently until it is soft, but not pulped.

2. Put in a stone jar, sprinkle acid on top, tie down at once with brown paper.

3. Use as required and tie down again.

(N.B.—This fruit is ready to use as stewed fruit or may be converted into jam by the addition of extra sugar.)

A HANDY IRONING PAD

THE housewife, who often finds it difficult to avoid creases when ironing around the gathers of sleeves and other small parts of garments, may welcome this idea for an ironing pad which will make a sleeve-board superfluous.

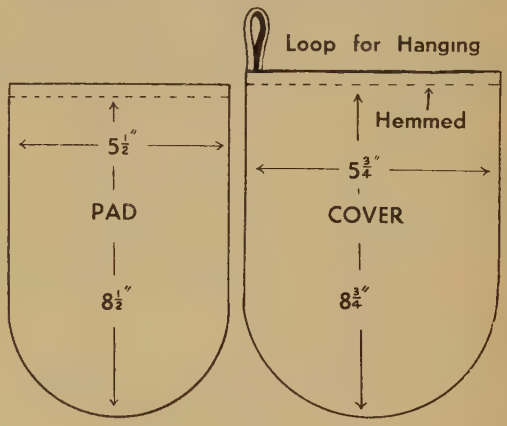
Take two pieces of unbleached calico measuring six inches by nine inches and cut out as illustrated. Make a bag by machining round a quarter of an inch from the edge, turn inside out and pad well with cotton wool—or better still with pieces of old blanket cut to size and shape. Machine the open end.

The Cover.

Now take two slightly larger pieces of calico and make a cover for the pad, this time hemming the open end and attaching a loop for hanging. The cover may be removed for washing.

To Use.

Slip the pad on the hand with the padded portion upward on the palm. The pad may now be placed inside a sleeve or other garment so that only a single thickness of material is above it to be ironed as on a sleeve-board.—H.M.G.



FACTS ABOUT WATER

THE Standard Imperial gallon introduced in 1824 contains 277.274 cubic inches and holds 10 lb. of distilled water with the barometer at 30 inches and the thermometer at 62° F.

The U.S.A. gallon contains 231 cubic inches and weighs 8-1/3 lb., so that 71 gallons are approximately equal to 59 Imperial gallons.

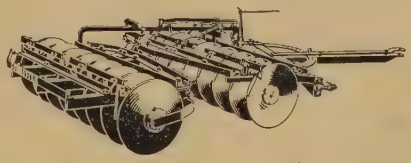
A cubic foot of water contains approximately 6¼ Imperial gallons or 7½ U.S.A. gallons and weighs about 62½ lb. (1,000 oz.) if fresh, and 64 lb. in the case of sea water.

Water boils at 80° Reaumur; 100° Centigrade and 212° Fahrenheit. It freezes at 1° Reaumur, 0° Centigrade and 32° Fahrenheit.

Approximately 4/5ths of the surface of the globe is covered with water and in addition about 4/5ths of the total mass of animal and vegetable matter on the earth also consists of water.

An inch of rain deposits about 22,687 gallons or 101 tons of water on each acre of ground. For convenience it is usually calculated at 100 tons per acre inch and as a gallon of water weighs 10 lb. the volume is calculated at 22,400 gallons.

When water is cooled it shrinks in volume until it reaches a temperature of 4° C. or 39.2° F. It then commences to increase in volume as the temperature is lowered and when the formation of ice occurs at 0° C. (30° F.) and expansion equal to about one-eleventh of the bulk of the water takes place.



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NEW ARRIVALS IN THE ROSE WORLD

By C. C. HILLARY

HAISHA, a full sister to the popular Peace hybrid tea

MORE new roses have been introduced since the war ended than in any similar period previously. In the past, however, new roses have not always meant better roses, and what is most pleasing about this latest batch of novelties is that quite a number show a distinct improvement over the older sorts. More especially is this improvement apparent in the newer hybrid polyantha roses which are now available in a range of colours undreamt of only a few years ago.

Perhaps the most outstanding of the newer hybrid tea roses is the variety Madame A. Meilland, which is also known by the name of "Peace." It is so different in style, shape and colour from all other hybrid teas that many consider it to be forerunner of a new race of garden roses. The blooms are very large, well-formed, and of globular appearance. The colour is creamy-yellow, with pink markings on the tips of the petals. At its best, it is a very beautiful rose indeed, but the colour pales sometimes in strong sunlight. The growth is excellent, and the light green foliage attractive and mildew-resistant to a marked degree.

Three new multi-coloured roses which are certain to become popular in the near future are President Nomblett, Madame Kriloff, and Lamplighter. Shades of copper, salmon, gold and scarlet have been fashioned into a delightful colour combination by the first two varieties, while Lamplighter fairly glows with the brilliance of its orange and deep pink colouring. All three have a vigorous, upright habit of growth and carry a plentiful supply of foliage.

SOME NEW REDS

Of the new red roses, Enid Harkness is likely to win most favour, although her full brother, William Harvey (they both came from the same seed hip) produces better-shaped flowers during hot weather. In spring and autumn the blooms of Enid Harkness are beautifully formed and a rich, velvety sheen on the inner face of the petals adds much to their charm. William Harvey is a larger rose—too large for the stems to carry with comfort in the autumn—but at other times it is delightful and has a most pronounced fragrance. Both are vigorous growers and bloom continuously throughout the year.

Charles Mallerin is another crimson rose of undoubted merit which is certain to achieve wide popularity. It is exceptionally dark, has an attractive, lustrous glow on the petals, and the blooms, which are large, full and fragrant, are carried on long stiff stems. The growth is exceptionally vigorous and the foliage is not so prone to mildew as it is with most other red varieties.

Another lovely red rose worthy of mention is Charles Gregory. This is not a large rose, but, except during the hottest weather, it is beautifully formed, and an orange glow at the base of the flowers gives it a distinctive appearance. Charles Gregory is an ideal rose for vase work and, as the plants grow well and flower freely, it should prove an acquisition in any garden.

LOWELL THOMAS, a new hybrid tea which has gained many adherents

POPULAR PINKS

Of the many new pink roses, I think the variety Rubaiyat deserves premier place. It is one of the most vigorous-growing roses in existence and is never without flowers, except when the bushes are pruned in winter. The deep pink blooms hold their colour well in bright sunshine and are sweetly perfumed. Rubaiyat has already won high honours in America, where it is regarded as an ideal rose both for garden and exhibition. It is certain to be widely planted in this State as soon as its good qualities are better known.

Another new pink rose which can be recommended is Verschuren's Pink. Somewhat paler in colour than Rubaiyat, it is exceptionally well shaped and lasts well both on the bush and when cut. Rod Stillman, a new Australian variety, and Katherine T. Marshall, a newcomer from America, are two other pink roses well worth consideration. Both roses grow very well and flower with considerable freedom. A touch of salmon seems only to enhance the beauty of the pink colouring in the well-shaped blooms.

SUPERB NEW YELLOWS

Several superb yellow roses provide a welcome addition to a colour section which has always been somewhat weak. One of the best of these is Lowell Thomas —a tall-growing variety with intense yellow blooms which hold their colour as well in bright sunshine as any other yellow rose in commerce. At times a reddish flush seems only to increase the depth of colouring. The growth is good and the plants are rarely without flowers.

Hunter's Moon, a new Irish rose in a pleasing shade of lemon, is another new variety which holds its colour very well. The blooms are long-pointed, well-shaped, and carried on long stems which are plentifully endowed with foliage in a most appropriate shade of green. Eleanor L. Grice, has deep yellow blooms which I am sure will prove an acquisition, more especially as they are sweetly fragrant—an unusual quality in yellow roses. Eleanor grows well and is most generous with her flowers, which are always well-shaped.

Among the newer hybrid polyantha roses there are many delightful kinds which can be used in a variety of ways. For low borders about 18 inches high

there is the lovely Pinkie. I know of nothing in the rose world which has greater appeal. With its hundreds of dainty buds and blossoms, a single bush is a cameo in itself, while a row of plants makes a picture which is just a sheer delight.

Then there is Alain, a new French creation, which carries masses of sweetly-perfumed, double, crimson flowers of large size in clusters of 20 and more on a stem. A single plant will easily fill a space a yard square and provide a rich splash of colour for most of the year but, like most other polyantha roses, it is most effective when a number of plants are massed togther in a large bed.

Two other superb creations which have thrilled everyone with their lovely offerings are Fashion and Vogue. Both are sisters and both are beautiful. Fashion favours coral salmon, while Vogue leans more towards salmon pink. Both grow equally well and are profuse with their flowers. For the creation of long, attractive borders, or for massing in large beds, Fashion and Vogue will be found most suitable, and they are just as effective when used together as when planted separately.

All of the roses mentioned above will be available at one or more local nurseries for planting in July. As stocks of some varieties are certain to be limited, early ordering is advisable.

WATER SAMPLES FOR TESTING

SAMPLES of water for stock, irrigation and domestic purposes, are analysed by the **Government Chemical Laboratories, Adelaide Terrace, Perth**, on compliance with the following:—

A. Each sample should:—

(a) Be approximately one pint of water in a clean container which has been previously rinsed with the water to be tested.

(b) Be clearly marked with the sender's name, address and date of sampling.

(c) Be securely packed and addressed to the **Government Chemical Laboratories.**

B. At the same time, a letter should be forwarded stating:—

(a) That the applicant is a bona fide farmer, market gardener, grazier, etc., and that the analysis is required in connection with his business as such.

(b) The source of the sample, e.g., bore, well, spring, etc., and its depth, and the location number of the property from which the sample was obtained.

(c) Enclosing the fee of 7s. per sample. This fee applies only to those who qualify under paragraph B (a) otherwise the fee is £1 1s. per sample.

Should the analysis be required very urgently, this should be stated in the letter and the cost of a telegram added to the fee, when a telegram will be sent immediately the analysis is completed.

Jerseys and Guernsey for Government Studs

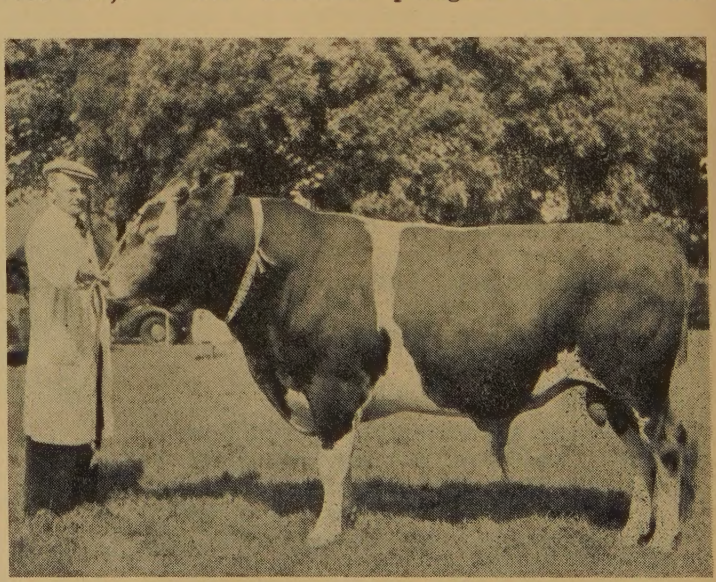
A JERSEY bull and five attractive young pedigree heifers, together with an outstanding Guernsey bull were imported to this State recently from leading studs in the Channel Islands. The seven animals completed their quarantine period last month and have been taken to Wokalup and Denmark Research Stations.

The animals were purchased on behalf of the West Australian Government by the Superintendent of Dairying (Mr. M. Cullity) who last year toured Europe and visited a number of famous studs and institutions connected with the dairying industry.

The Guernsey bull is Hero of Les Simons, bred by Mr. J. B. Tostevin, Les Simons, Tonteval, Guernsey Island. He is No. 7687 P.S. on the Guernsey Royal Agricultural Society's herd book and his sire is Honoria's May Slogan (7088 P.S.). The dam of the bull is Claraella V of the Simons (45811 P.S.). Hero of Les Simons was dropped on April 8, 1949, and last year gained the Junior Championship and was Reserve to the Grand Champion of Guernsey Island.

The Jerseys, which will form a nucleus of a new Government Jersey stud at the Wokalup Research Station, are headed by the bull Genuine Rochette's Golden (No. 8339) a very typey animal born April 7, 1950. This bull was bred by A. A. Holley, of the Parish of St. Mary, Jersey Island. His sire was Genuine Rochette's Wonder (No. 8067) and his dam Genuine Lady Rochette (No. 53040). Genuine Lady Rochette in four lactations produced 559 lb., 639 lb., 628 lb. and 714 lb. of butterfat. Her yields of milk for the same lactations were 9,585, 14,041, 11,308 and 12,706 lb. respectively. Shortly after he was purchased by Mr. Cullity, Genuine Rochette's Golden gained the championship award at the St. Mary's, St. Peter's and St. Ouen's show on Jersey Island.

The five Jersey heifers, Hautroyal Galinthina, Seymour Victorious Blossom, Jester's Marie, Oxfordia Galinthina and La Becquetterie's Jollie were purchased from leading studs and are in calf to five different pedigree bulls on the island of Jersey.



The Guernsey bull, Hero of Les Simons.

All the animals stood the voyage exceedingly well and should prove valuable acquisitions to their breeds in this State.

SUNRISE AND SUNSET TIMES FOR MARCH-APRIL, 1952

(Supplied by the Government Astronomer)

Times of sunrise and sunset for every fifth day, are given for a number of towns throughout the State. Times for a town not on the list may be estimated if its position in relation to one or more of the listed towns is known. The times given for sunrise are those of the first appearance of the top edge of the sun over a true horizon; those for sunset give the time of the sun's disappearance below a true horizon. Situation in a valley would make the sun appear to rise later, and on a hill it would appear earlier.

SUNRISE

Month	Day of Month	Broome	Port Hedland	Onslow	Carnarvon	Yalgoo	Geraldton	Moora	Kalgoorlie	Southern Cross	Merredin	Perth	Tammin	Northam	Narrogin	Collie	Bunbury	Katanning	Bridgetown	Hopetoun	Esperance	Cape Leeuwin	Albany
March	1	5·50	6·4	6·16	6·20	6·5	6·14	6·6	5·44	5·53	5·57	6·6	5·57	6·2	6·1	6·5	6·7	5·58	6·3	5·48	5·41	6·8	5·55
,,	5	5·52	6·6	6·19	6·22	6·8	6·17	6·9	5·47	5·56	6·0	6·10	6·3	6·6	6·4	6·8	6·10	6·2	6·7	5·52	5·45	6·12	5·57
,,	10	5·53	6·7	6·20	6·24	6·11	6·19	6·12	5·50	5·59	6·4	6·13	6·6	6·9	6·7	6·11	6·13	6·5	6·10	5·55	5·48	6·15	6·2
,,	15	5·54	6·9	6·22	6·27	6·14	6·22	6·16	5·54	6·3	6·7	6·17	6·10	6·13	6·11	6·15	6·17	6·9	6·14	5·59	5·52	6·19	6·7
,,	20	5·55	6·10	6·24	6·29	6·16	6·25	6·19	5·57	6·6	6·10	6·20	6·13	6·16	6·15	6·19	6·21	6·13	6·18	6·3	5·56	6·23	6·11
,,	25	5·56	6·11	6·25	6·30	6·19	6·28	6·22	6·0	6·9	6·13	6·23	6·16	6·19	6·18	6·22	6·24	6·16	6·21	6·6	5·59	6·26	6·14
,,	31	5·58	6·14	6·29	6·34	6·23	6·33	6·27	6·5	6·14	6·18	6·29	6·22	6·25	6·24	6·28	6·30	6·23	6·28	6·13	6·6	6·33	6·21
April	1	5·58	6·14	6·29	6·34	6·23	6·33	6·27	6·5	6·14	6·18	6·29	6·22	6·25	6·24	6·28	6·30	6·23	6·28	6·13	6·6	6·33	6·21
,,	5	5·58	6·14	6·29	6·35	6·25	6·34	6·30	6·8	6·17	6·21	6·31	6·24	6·27	6·27	6·31	6·33	6·25	6·30	6·15	6·8	6·35	6·24
,,	10	5·59	6·15	6·30	6·37	6·27	6·36	6·32	6·10	6·19	6·23	6·34	6·27	6·30	6·29	6·33	6·35	6·28	6·33	6·18	6·11	6·38	6·27
,,	15	6·1	6·17	6·33	6·40	6·30	6·40	6·36	6·14	6·23	6·27	6·38	6·31	6·34	6·33	6·37	6·39	6·32	6·37	6·22	6·15	6·42	6·31
,,	20	6·2	6·19	6·35	6·43	6·33	6·43	6·39	6·17	6·26	6·30	6·41	6·34	6·37	6·37	6·41	6·43	6·36	6·41	6·26	6·19	6·46	6·35
,,	25	6·3	6·20	6·36	6·44	6·36	6·46	6·42	6·20	6·29	6·34	6·44	6·37	6·40	6·41	6·45	6·47	6·40	6·45	6·30	6·23	6·50	6·39
,,	30	6·5	6·22	6·38	6·47	6·39	6·49	6·46	6·24	6·33	6·37	6·48	6·41	6·44	6·45	6·49	6·51	6·44	6·49	6·34	6·27	6·54	6·44

SUNSET

Month	Day of Month	Broome	Port Hedland	Onslow	Carnarvon	Yalgoo	Geraldton	Moora	Kalgoorlie	Southern Cross	Merredin	Perth	Tammin	Northam	Narrogin	Collie	Bunbury	Katanning	Bridgetown	Hopetoun	Esperance	Cape Leeuwin	Albany
March	1	6·17	6·33	6·48	6·55	6·45	6·54	6·50	6·28	6·37	6·41	6·52	6·45	6·48	6·47	6·51	6·53	6·46	6·51	6·36	6·27	6·56	6·45
,,	5	6·14	6·30	6·45	6·52	6·42	6·51	6·47	6·25	6·34	6·38	6·48	6·41	6·44	6·44	6·48	6·50	6·42	6·47	6·32	6·25	6·52	6·41
,,	10	6·10	6·26	6·41	6·46	6·35	6·45	6·40	6·18	6·27	6·31	6·41	6·34	6·37	6·37	6·41	6·43	6·35	6·40	6·25	6·18	6·45	6·34
,,	15	6·7	6·22	6·36	6·42	6·31	6·40	6·34	6·12	6·21	6·25	6·36	6·29	6·32	6·31	6·35	6·37	6·30	6·35	6·20	6·13	6·40	6·28
,,	20	6·3	6·18	6·32	6·37	6·25	6·34	6·28	6·6	6·15	6·19	6·29	6·22	6·25	6·24	6·28	6·30	6·22	6·27	6·12	6·5	6·32	6·20
,,	25	5·58	6·13	6·27	6·32	6·19	6·28	6·22	6·0	6·9	6·13	6·24	6·16	6·19	6·17	6·21	6·23	6·15	6·20	6·5	5·58	6·25	6·13
,,	31	5·54	6·8	6·21	6·25	6·12	6·20	6·14	5·52	6·1	6·5	6·14	6·7	6·10	6·9	6·13	6·15	6·6	6·11	5·56	5·49	6·16	6·4
April	1	5·53	6·7	6·20	6·24	6·11	6·19	6·13	5·51	6·0	6·4	6·13	6·6	6·9	6·8	6·12	6·14	6·5	6·10	5·55	5·48	6·15	6·3
,,	5	5·49	6·3	6·16	6·20	6·6	6·15	6·7	5·45	5·54	5·58	6·8	6·1	6·4	6·2	6·6	6·8	6·0	6·5	5·50	5·43	6·10	5·57
,,	10	5·45	5·59	6·12	6·15	6·1	6·10	6·2	5·40	5·49	5·53	6·2	5·55	5·58	5·57	6·1	6·3	5·54	5·59	5·44	5·37	6·4	5·51
,,	15	5·42	5·56	6·8	6·11	5·56	6·4	5·56	5·34	5·43	5·47	5·56	5·49	5·52	5·51	5·55	5·57	5·48	5·53	5·38	5·31	5·58	5·45
,,	20	5·39	5·52	6·4	6·6	5·51	5·59	5·51	5·29	5·38	5·42	5·51	5·44	5·47	5·45	5·49	5·51	5·42	5·47	5·32	5·25	5·52	5·39
,,	25	5·35	5·48	6·0	6·2	5·46	5·54	5·46	5·24	5·33	5·37	5·45	5·38	5·41	5·39	5·43	5·45	5·35	5·40	5·25	5·18	5·45	5·32
,,	30	5·32	5·45	5·57	5·58	5·42	5·50	5·41	5·19	5·28	5·32	5·41	5·34	5·37	5·34	5·38	5·40	5·31	5·36	5·21	5·14	5·41	5·27

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ERRATA

In the September, 1951, issue of this journal some of the names and figures given in tables under the heading of "Dairy Herd Improvement Scheme 1950-51" were incorrect, and the following alterations should be made:—

Table 17, Page 277.

The Highest Producing Cow in each Unit

This should read for the Northcliffe Unit:—

Owner.	Unit.	Name of Cow.	Breed.	Milk. lb.	Test. %	Butterfat. lb.
R. Minchin	Northcliffe	Miggs	Shorthorn x	8,346	6·0	508
		in place of				
Sanderson & Son	Northcliffe	Brindle	Jersey x	9,338	4·9	463

Table 12, Page 274.

"Greenfields Prince," shown as Friesian, should read Guernsey.

Page 277, September 1951 Journal, Table 17.

The Highest Producing Cow in Each Unit

Mr. D. Della should be at the top of the list with a production for Adelaide 2nd of 9,939 lb. milk 5.5% test 547 lb. butterfat.